



**BETHLEHEM  
STRUCTURAL  
SHAPES**





MAY 9 1961

Mill  
Practices

# BETHLEHEM STRUCTURAL SHAPES

INFORMATION AND TABLES FOR  
*Architects, Engineers, and Designers*  
OF BUILDINGS AND OTHER STEEL STRUCTURES



BETHLEHEM STEEL COMPANY

*General Offices: BETHLEHEM, PA.*

CATALOG S-58



For strength  
... economy  
... versatility

*Rolling Schedules and Supplementary Information  
are being issued from time to time. This information  
may be obtained from our nearest Sales Office.  
Consult us on your requirements.*

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## *General Information*

This catalog gives information on structural sections which are included in Simplified Practice Recommendation R 216-46 for Hot-Rolled Carbon Steel Structural Shapes, approved by the United States Department of Commerce through the National Bureau of Standards. It supersedes all previous Bethlehem publications relating to structural shapes.

All shapes that are not noted as "Special" are rolled at frequent intervals and are readily obtainable from the mill in lots of any size. For this reason, the selection of these shapes, which are shown under Part I, is recommended.

Shapes noted as "Special" under Part II are generally used for special purposes, and consequently the rollings may be irregular and infrequent. When required tonnage of any of these shapes is comparatively small, it may be advantageous to use the nearest size shown under Part I. Before ordering any of these sizes consult the nearest sales office for delivery information.

Certain Bethlehem wide-flange sections have a 5 pct slope on the inside faces of the flanges and others have flanges whose inside and outside faces are parallel to each other. The light beams, joists and stanchions have a 2 pct slope on the inside faces of the flanges.

The radii of fillets and roundings shown are those to which the rolls are turned. The wear on rolls during process of rolling is likely to change these fillets and roundings so that proper allowance should be made for any fittings affected by such changes.

In computing the weights and properties of Bethlehem wide-flange shapes, light beams, joists and stanchions, the fillets have been included. In computing the weights of standard I-beams, channels and shipbuilding bulb angles, the actual profiles have been used, including the fillets and the roundings, while in computing the weights of angles, zeos and car-building bulb angles, the fillets and the roundings are not included. The properties of shipbuilding bulb angles and their areas are based upon the exact profiles. In computing the published areas and properties of standard I-beams and channels and also of all angles, zeos and car-building bulb angles, the fillets and the roundings are not included. These methods are in accordance with industry standards.

The rolling and cutting tolerances shown in this catalog are in accordance with accepted standards.

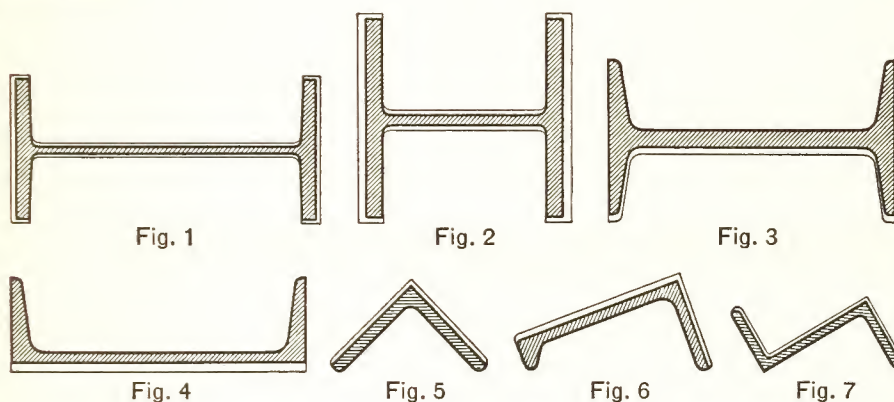


All structural shapes in this catalog are rolled of steel conforming to American Society for Testing Materials specifications. Material conforming to other specifications may be furnished by special arrangement.

Weights of rolled-steel shapes are computed on the basis that 1 cu ft of steel weighs 489.6 lb, and 3.4 times the sectional area in sq in. equals the weight per lin ft of the section.

The dimensions and weights of shapes published in this catalog are theoretical and are subject to the usual variations.

In the tables under the caption "Section Number and Nominal Size," the notations given in bold type are the manufacturer's standard nomenclature for the respective section groups. These are shown for convenience of identification in estimating, ordering, and for rolling purposes.



The beams and channels shown on pp 32 to 39 conform to industry standards. The terms "standard" and "American standard" are almost universally used in connection with this series of shapes.


Figs. 1 and 2 illustrate the method of increasing the areas and weights of Bethlehem wide-flange shapes, whereby the thickness of both flange and web may be changed with a corresponding change in the beam depth and flange width. The areas and weights of standard I-beams and channels are increased from the minimum as shown by Figs. 3 and 4, whereby an equal amount is added to the thickness of the webs and to the widths of the flanges, all other dimensions remaining unchanged. In the case of angles as shown in Fig. 5, equal increments are added to the thickness of each leg, which also slightly increases the length of each leg. The areas and weights of bulb angles are increased from the minimum or base sizes as shown by Fig. 6 and are founded upon a method which increases the thickness of the web to an extent twice as great as that of the flange. Fig. 7 shows the method of increasing the areas and weights of zeels.

  
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## STANDARD MILL PRACTICES

### *Rolling and Cutting Tolerances*

During the production of rolled structural shapes there is a certain amount of roll wear that causes the finished pieces to vary from the theoretical or published dimensions to which the rolls are turned. This roll wear begins as soon as the pieces enter the rolls and continues until the rolling is completed. To make the proper allowance for this roll wear, certain standard rolling tolerances have been established which the rolling mills should meet. These tolerances are shown on pp 6 to 8, inclusive. Any other tolerances are subject to special negotiations with the mill. Diagrams are exaggerated for clarity.

### *Surface Finish and Conditioning*

























During the process of pouring ingots, splashings of molten metal sometimes cling to the inside of the mold, and as the hot metal rises it picks up these cold splashings which later show up in the form of minor surface imperfections. These imperfections are of minor importance and in general do not affect the full utility of the piece. To determine the extent of any imperfection, it is chipped out, and then if not serious, is filled with weld metal and ground down to make a workmanlike finish. The limitations covering this procedure are shown on p 10.

### *Cambering*

At the present time many beam bridges are being erected to specifications calling for cambering to various dimensions. Experience over many years has taught the mills the limitations to which they can camber various sizes of beams. Tables covering these limitations are shown on p 11. Cambering of any sizes not included in these tables must be referred to the mill on inquiry.

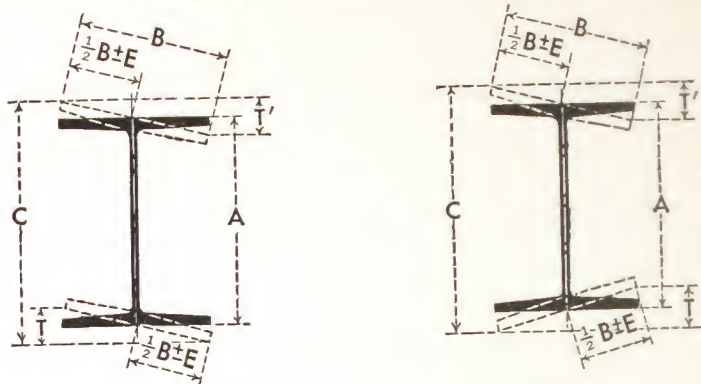


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# STANDARD MILL PRACTICES

## Bethlehem Wide-Flange Shapes



### ROLLING TOLERANCES, INCHES

Section Nominal Size	A Depth		B Flange Width		T + T'	E	C
	Over Theor	Under Theor	Over Theor	Under Theor	Flanges Out-of-Square	Web Off Center	Max Depth at any Cross Section Over Theor Depth
Up to 12, incl	1/8	1/8	1/4	3/16	3/16 max	3/16 max	1/4
Over 12	1/8	1/8	1/4	3/16	1/4 max	3/16 max	1/4

(A) is measured at center line of web. (B) is measured parallel to flange. (C) is measured parallel to web.

### CUTTING TOLERANCES, INCHES

Nominal Depth	Variations from Specified Length for Lengths Given			
	To 30 ft incl		Over 30 ft	
	Over	Under	Over	Under
Beams up to 24, incl	3/8	3/8	3/8 plus 1/16 for each additional 5 ft or fraction thereof.	3/8
Beams over 24 and all Columns	1/2	1/2	1/2 plus 1/16 for each additional 5 ft or fraction thereof.	1/2

### OTHER TOLERANCES

**VARIATION IN WEIGHT:** The tolerance for the calculated or specified weight is  $\pm 2.5$  pct.

**ENDS OUT-OF-SQUARE:** 1/4 in. in per in. of depth, or of flange width, if it is greater than depth.

**MILLING:** For sections which are ordered to be milled by the producer, customer should state on orders whether one or both ends are to be milled, and state definitely what finished length is required.

On sections milled one end only, standard length tolerances will apply.

On sections milled two ends, length tolerance will be  $\pm 1/16$  in. for lengths up to 30 ft, and  $\pm 3/32$  in. for lengths 30 ft to 50 ft.

On sections to be milled, we will add to finished length the mill's standard allowance for milling, from 1/4 in. to 3/8 in., depending on section and length, and invoice will be rendered on basis of finished length plus the required allowance for milling.

**OUT-OF-STRAIGHT:** Camber or sweep =  $\frac{1}{8}$  in.  $\times$   $\frac{\text{number of feet of total length}}{10^*}$

When certain sections† with flange width approximately equal to depth are specified on order as columns,

Lengths to 45 ft incl:  $\frac{1}{8}$  in.  $\times$   $\frac{\text{total length in feet}}{10}$  but not over 3/8 in.

Lengths over 45 ft:  $\frac{3}{8}$  in. +  $\frac{1}{8}$  in.  $\times$   $\frac{\text{total length in feet}-45}{10}$

\* Figure is 5 for sweep when flange width is less than 6 in.

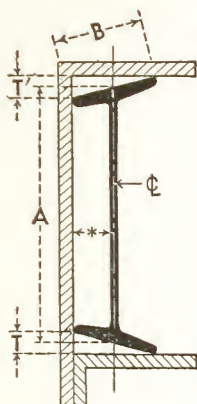
† Applies only to: 8-in.-deep Sections 31 lb per ft and heavier 12-in.-deep Sections 65 lb per ft and heavier  
10-in.-deep Sections 49 lb per ft and heavier 14-in.-deep Sections 78 lb per ft and heavier

If other sections are specified on order as columns, tolerance will be subject to negotiation with the producer.



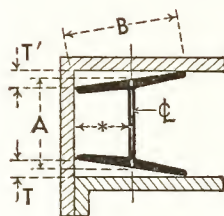
# STANDARD MILL PRACTICES

## American Standard Beams and Channels Car and Ship Channels Standard Mill H-Beams

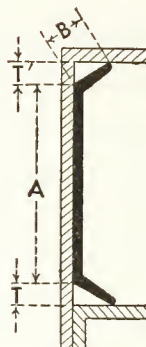


American Standard Beams

\* Back of square and  $\phi$  of web to be parallel when measuring "out-of-square."



Standard Mill H-Beams



Channels

T + T' applies when flanges of channels are toed in or out.

### ROLLING TOLERANCES, INCHES

Section	Nominal Size	A Depth†		B Flange Width		T + T' Out-of-Square Per in. of B, in.
		Over Theor	Under Theor	Over Theor	Under Theor	
American Standard Beams	3 to 7, incl	$\frac{3}{32}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{32}$
	Over 7 to 14, incl	$\frac{1}{8}$	$\frac{3}{32}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{1}{32}$
	Over 14 to 24, incl	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{32}$
Standard Mill H-Beams	4	$\frac{3}{32}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{32}$
	5	$\frac{3}{32}$	$\frac{1}{16}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{1}{32}$
	6 and 8	$\frac{1}{8}$	$\frac{3}{32}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{32}$
Channels	3 to 7, incl	$\frac{3}{32}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{32}$
	Over 7 to 14, incl	$\frac{1}{8}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{5}{32}$	$\frac{1}{32}$
	Over 14	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{32}$

† (A) is measured at center line of web for beams; and at back of web for channels.

### CUTTING TOLERANCES, INCHES

All Standard Sections	To 30 ft, incl		Over 30 ft to 40 ft, incl		Over 40 ft to 50 ft, incl		Over 50 ft to 65 ft, incl		Over 65 ft	
	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under
	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	1	$\frac{1}{4}$	$1\frac{1}{8}$	$\frac{1}{4}$	$1\frac{1}{4}$	$\frac{1}{4}$

### OTHER TOLERANCES

**VARIATION IN WEIGHT:** The tolerance for the calculated or specified weight is  $\pm 2.5$  pct.

**ENDS OUT-OF-SQUARE:**  $\frac{1}{4}$  in. per in. of depth.

**OUT-OF-STRAIGHT:**

$$\text{Camber} = \frac{1}{8} \text{ in.} \times \frac{\text{number of feet of total length}}{5}$$

**Sweep:** Due to the extreme variations in flexibility of standard beams and channels about the Y-Y axis, straightness tolerances for sweep are subject to negotiation between purchaser and producer for the individual sections involved, but will in no case be less than the established straightness tolerance for camber for such sections.

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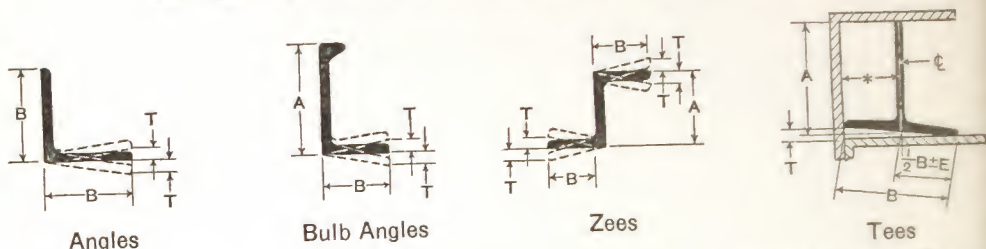
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# STANDARD MILL PRACTICES

## Angles, Bulb Angles, Zees and Tees



\* Back of square and  $\phi$  of stem to be parallel when measuring "out-of-square."

### ROLLING TOLERANCES, INCHES

Section	Nominal Size	A Depth		B Flange Width or Length of Leg		T Out-of- Square per in. of B	E Web Off Center
		Over Theor	Under Theor	Over Theor	Under Theor		
Angles†	3 to 4, incl	....	....	1/8	3/32	3/128 **	....
	Over 4 to 6, incl	....	....	1/8	1/8	3/128 **	....
	Over 6	....	....	3/16	1/8	3/128 **	....
Bulb Angles	Depth 3 to 4, incl	1/8	1/16	1/8	3/32	3/128 **	....
	Over 4 to 6, incl	1/8	1/16	1/8	1/8	3/128 **	....
	Over 6	1/8	1/16	3/16	1/8	3/128 **	....
Rolled Tees	Stem or Flange 5 and under	3/32	1/16	1/8	1/8	1/32	3/32 max
	Stem or Flange Over 5 to 7	3/32	1/16	1/8	1/8	1/32	1/8 max
Zees	3 to 4, incl	1/8	1/16	1/8	3/32	3/128 **	....
	Over 4 to 6, incl	1/8	1/16	1/8	1/8	3/128 **	....

(A) is measured at center line of stem for tees. \*\* 3/128 in. per in. = 1 1/2 deg.

† For unequal leg angles, longer leg determines classification.

### CUTTING TOLERANCES, INCHES

All Standard Sections	To 30 ft, incl		Over 30 ft to 40 ft, incl		Over 40 ft to 50 ft, incl		Over 50 ft to 65 ft, incl		Over 65 ft	
	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under
	1/2	1/4	3/4	1/4	1	1/4	1 1/8	1/4	1 1/4	1/4

### OTHER TOLERANCES

**VARIATION IN WEIGHT:** The tolerance for the calculated or specified weight is  $\pm 2.5$  pct.

**ENDS OUT-OF-SQUARE:** Angles††—3/128 in. per in. of leg length or 1 1/2 deg.

Bulb Angles—3/128 in. per in. of depth or 1 1/2 deg.

Rolled Tees††—1/4 in. per in. of flange or stem.

Zees—3/128 in. per in. of sum of both flange lengths.

**OUT-OF-STRAIGHT:**

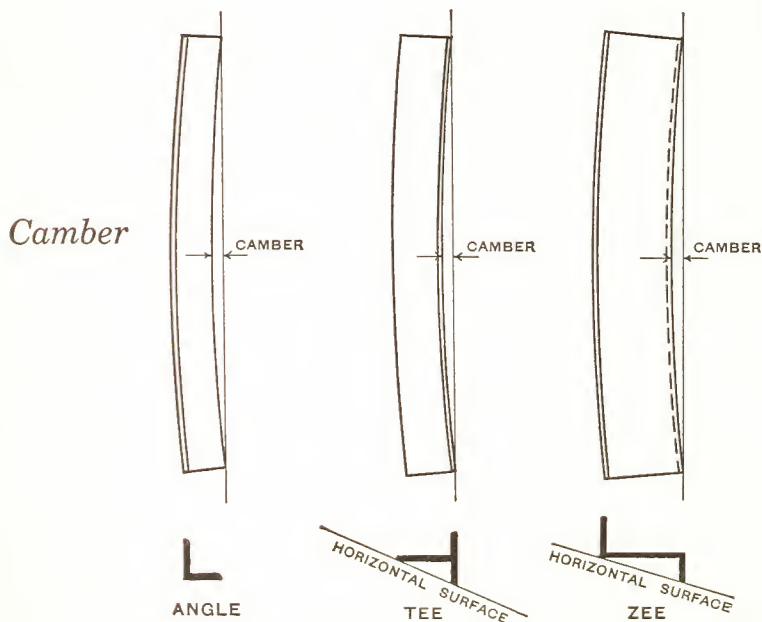
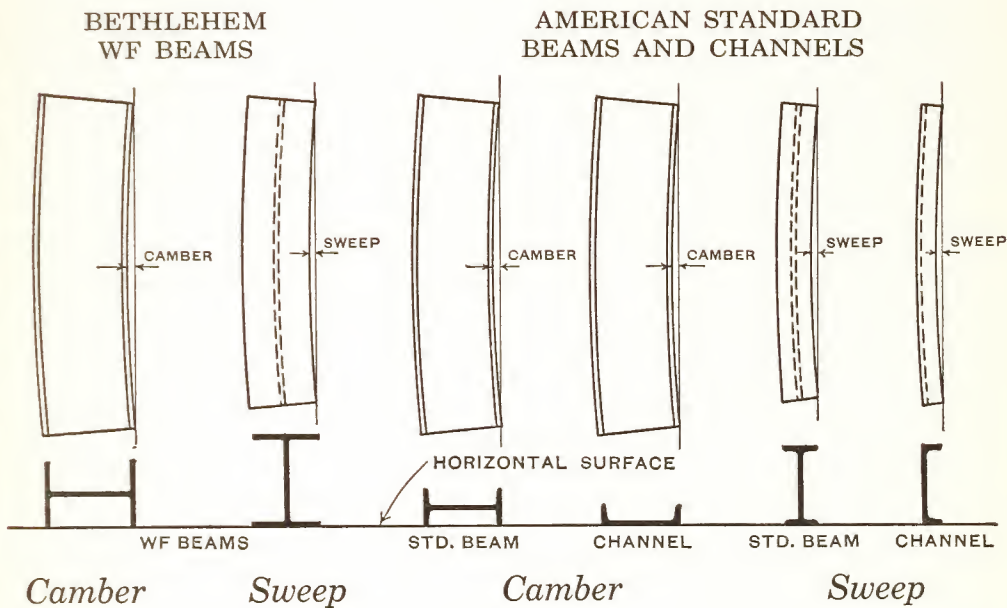
$$\text{Camber} = \frac{1}{8} \text{ in.} \times \frac{\text{number of feet of total length}}{5}$$

†† Tolerances for ends out-of-square are determined on the longer members of the section.



# STANDARD MILL PRACTICES

## Positions for Measuring Camber and Sweep



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# STANDARD MILL PRACTICES

## *Surface Finish*

**Surface Finish and Conditioning.** Correcting minor imperfections at any location in structural shapes and piling sections by grinding or by chipping and grinding to sound metal and depositing weld metal by arc-fusion welding, in accordance with the limitations prescribed below, is regular mill practice.

Imperfections that do not affect the full utility of the piece, shall not be considered as injurious defects. Such pieces may be processed by the following methods in order to give them a workmanlike finish.

(1) For material less than  $\frac{3}{8}$  in. in nominal thickness, when the imperfections are not more than  $\frac{1}{32}$  in. in depth, they may be removed by grinding, or chipping and grinding.

(2) For material  $\frac{3}{8}$  in. and over in nominal thickness, when the imperfections are not more than  $\frac{1}{16}$  in. in depth, they may be removed by grinding, or chipping and grinding.

(3) For material  $\frac{3}{8}$  in. and over in nominal thickness, when the imperfections are more than  $\frac{1}{16}$  in. in depth, such imperfections may be removed by chipping and the depression filled by depositing weld metal under limiting conditions, as follows:

(a) The cross-sectional area of any piece at any location shall not be reduced more than 1.5 pct, nor shall the total area of the chipped surface of any piece exceed 2 pct of the total surface area of that piece.

(b) After removal of any imperfections preparatory to welding, the thickness of the material at any location must not be reduced by more than 20 pct of the nominal thickness of the shape.

(c) The interlock of any sheet-piling section may be conditioned by welding and grinding to correct or build up the interlock at any location not to exceed 2 pct of the total surface area or length of that piece.

(d) An experienced mill inspector shall inspect the work to see that the defects have been completely removed and that the limitation specified in items (a), (b) and (c) have not been exceeded.

(e) All welding shall be performed by qualified welding operators using suitable coated mild-steel electrodes. The welds shall be sound; the weld metal being thoroughly fused on all surfaces and edges without undercutting or overlap. Weld metal shall project at least  $\frac{1}{16}$  in. above the rolled surface after welding, and the projecting metal shall be removed by grinding, or chipping and grinding, to make it flush with the rolled surface and produce a workmanlike finish.



# STANDARD MILL PRACTICES

## Cambering of Rolled Beams

The following information covers the limitations upon cold-cambering of deep beams at the mill.

Maximum length for cambering is 100 ft.

Maximum camber, measured at mid-length, is shown in the table below:

Sections	Maximum Camber, in.								
	5	4½	4	3½	3	2½	2	1½	1
	Length, ft								
24-in. Wide Flange and over	85	75	65	55	50	45	40	35	30
21-in. Wide Flange 24-in. Standard	80	70	60	50	45	40	35	30	25

Camber will approximate a simple regular curve nearly the full length of the beam, or between any two points on beam as specified. Reverse or other compound curves will not be undertaken. Camber shall be specified by the ordinate at mid-length of the portion of the beam to be curved (cambered). Ordinates at other points shall not be specified. The camber is subject to a tolerance as follows:

	plus tolerance	minus tolerance
Lengths 50 ft and less	½ in.	0
Lengths over 50 ft	½ in. + ⅛ in. for each 10 ft or fraction thereof in excess of 50 ft	0

When a small amount of camber is specified some of it may be lost due to the release of stresses that result from the cold work in cambering. It has been determined by experience that certain minimum amounts of camber are likely to remain permanent, as shown in table below:

Wide Flange Sections in.	Minimum Camber Likely to Remain Permanent in.								
	30 ft Length	35 ft Length	40 ft Length	45 ft Length	50 ft Length	55 ft Length	65 ft Length	75 ft Length	85 ft Length
36	½	½	¾	1	1¼	1½	2¼	3	3¾
33	½	¾	1	1¼	1½	1¾	2½	3¼	4
30	½	¾	1	1¼	1½	2	2¾	3½	4½
27	¾	1	1	1½	1¾	2	3	4	5
24	¾	1	1¼	1½	2	2½	3¼	4½	5

Wide Flange Sections and Standard Beams	Minimum Camber Likely to Remain Permanent in.								
	25 ft Length	30 ft Length	35 ft Length	40 ft Length	45 ft Length	50 ft Length	60 ft Length	70 ft Length	80 ft Length
21-in. WF	½	¾	1	1½	1¾	2¼	3¼	4½	5
24-in. Standard	½	¾	1	1¼	1½	2	2¾	3¾	5

While cambers less than shown in this table can be furnished, no guarantee can be given with respect to their permanency. In some cases sections other than those listed in the table may be cambered within certain limits. All special cambering not listed in the above tables must be submitted for inquiry and negotiation and the terms of the order will govern.

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## LIST OF SYMBOLS

- A Area in square inches
- b Flange width, inches and decimals
- b' Flange width, inches and fractions, approximate
- D Diagonal dimension, inches and fractions, approximate
- d Depth, inches and decimals
- d' Depth, inches and fractions, approximate
- g-g' Distance center of gravity from neutral axes
- I Moment of inertia about major axis X-X
- I' Moment of inertia about minor axis Y-Y
- R Radius of fillets at root—inches and decimals
- R', R'', R''' Radius of roundings, inches
  - r Radius of gyration about major axis X-X, inches
  - r' Radius of gyration about minor axis Y-Y, inches
  - r'' Radius of gyration about axis Z-Z, inches
- S Section modulus about major axis X-X
- S' Section modulus about minor axis Y-Y
- T Tangent distance on web between fillets
- T' Distance between points of tangency on inside face of flanges
- t Flange thickness, average—inches and decimals
- t' Flange thickness at toe—inches and fractions
- t'' Flange thickness at root—inches and fractions
- W Web thickness, inches and decimals
- W' Web thickness, inches and fractions

Deviations from the above symbols are indicated at the places of exception.



# SHAPES

## *Part I*

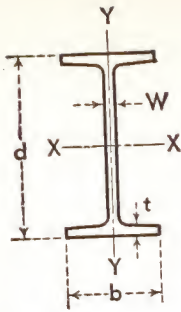
All sections shown on pp 14 to 56, inclusive, are rolled at frequent intervals, and comparatively prompt deliveries can be expected from the mill. It is therefore recommended that users, wherever possible, make their selection from this group. Furthermore, some of these sizes are carried in stock by fabricators and warehouses.

These pages cover information regarding Bethlehem Wide Flange Shapes, Bethlehem Light Beams and Light Columns, Bethlehem Solid-Web Joists, Bethlehem Stanchions, Standard Beams, Standard Channels, Standard Angles, Bethlehem Bearing Piles, Steel Sheet Piling, and Structural (Split Beam) Tees.

On p 48 are shown tables of dimensions, weights and properties of a series of Bethlehem Bearing Piles. The sections are obtained by spreading the rolls of corresponding wide-flange sections, and prompt deliveries can therefore be made.

The table covering Structural Tees, produced by splitting Beam Sections, appears on pp 49 to 56, inclusive. Prompt deliveries can be made of sizes shown in this table.





# BETHLEHEM WIDE-FLANGE SHAPES

*Theoretical Dimensions and Properties for Designing*

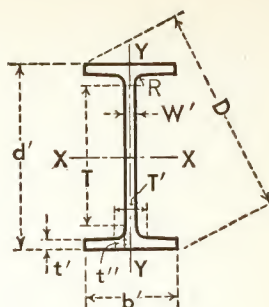
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
	lb	in. <sup>2</sup>	in.	in.	in.	in.						
<b>*B 36A</b> 36" WF 36 x 16½	300	88.17	36.72	16.655	1.680	.945	20290.2	1105.1	15.17	1225.2	147.1	3.73
	280	82.32	36.50	16.595	1.570	.885	18819.3	1031.2	15.12	1127.5	135.9	3.70
	260	76.56	36.24	16.555	1.440	.845	17233.8	951.1	15.00	1020.6	123.3	3.65
	245	72.03	36.06	16.512	1.350	.802	16092.2	892.5	14.95	944.7	114.4	3.62
	230	67.73	35.88	16.475	1.260	.765	14988.4	835.5	14.88	870.9	105.7	3.59
<b>*B 36</b> 36" WF 36 x 12	194	57.11	36.48	12.117	1.260	.770	12103.4	663.6	14.56	355.4	58.7	2.49
	182	53.54	36.32	12.072	1.180	.725	11281.5	621.2	14.52	327.7	54.3	2.47
	170	49.98	36.16	12.027	1.100	.680	10470.0	579.1	14.47	300.6	50.0	2.45
	160	47.09	36.00	12.000	1.020	.653	9738.8	541.0	14.38	275.4	45.9	2.42
	150	44.16	35.84	11.972	.940	.625	9012.1	502.9	14.29	250.4	41.8	2.38
<b>*B 33A</b> 33" WF 33 x 15¾	240	70.52	33.50	15.865	1.400	.830	13585.1	811.1	13.88	874.3	110.2	3.52
	220	64.73	33.25	15.810	1.275	.775	12312.1	740.6	13.79	782.4	99.0	3.48
	200	58.79	33.00	15.750	1.150	.715	11048.2	669.6	13.71	691.7	87.8	3.43
<b>*B 33</b> 33" WF 33 x 11½	152	44.71	33.50	11.565	1.055	.635	8147.6	486.4	13.50	256.1	44.3	2.39
	141	41.51	33.31	11.535	.960	.605	7442.2	446.8	13.39	229.7	39.8	2.35
	130	38.26	33.10	11.510	.855	.580	6699.0	404.8	13.23	201.4	35.0	2.29
<b>*B 30A</b> 30" WF 30 x 15	210	61.78	30.38	15.105	1.315	.775	9872.4	649.9	12.64	707.9	93.7	3.38
	190	55.90	30.12	15.040	1.185	.710	8825.9	586.1	12.57	624.6	83.1	3.34
	172	50.65	29.88	14.985	1.065	.655	7891.5	528.2	12.48	550.1	73.4	3.30
<b>*B 30</b> 30" WF 30 x 10½	132	38.83	30.30	10.551	1.000	.615	5753.1	379.7	12.17	185.0	35.1	2.18
	124	36.45	30.16	10.521	.930	.585	5347.1	354.6	12.11	169.7	32.3	2.16
	116	34.13	30.00	10.500	.850	.564	4919.1	327.9	12.00	153.2	29.2	2.12
	108	31.77	29.82	10.484	.760	.548	4461.0	299.2	11.85	135.1	25.8	2.06

\* These shapes have flange slope of 5 pct, and flange thicknesses shown are average thicknesses.



# BETHLEHEM WIDE-FLANGE SHAPES

*Approximate Dimensions for Detailing*



Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section d'	Flange				Web Thickness (Nominal) W'	Tangent	Distance (Nominal) T'	Diagonal Dimension (Nominal) D	Radius of Fillet (Root) R	Slope Inside Flange
			Width (Nominal) b'	Thickness (Nominal) at Toe t'	Thickness (Nominal) at Root t''	Web (Nominal) T						
	lb.	in.	in.	in.	in.	in.	in.	in.	in.	in.	pct	
<b>*B36A</b> 36" WF 36 x 16½	300	36¾	16⅝	1½	1⅞	15/16	31⅛	2¾	40⅞	.95	5.0	
	280	36½	16⅝	1⅜	1¾	7/8	31⅛	21 1/16	40⅞	.95	5.0	
	260	36¼	16½	1¼	1⅝	7/8	31⅛	2⅝	39⅞	.95	5.0	
	245	36	16½	1⅛	1⅞	13/16	31⅛	2⅝	39¾	.95	5.0	
	230	35⅞	16½	1 1/16	1 7/16	¾	31⅛	2⅞	39½	.95	5.0	
<b>*B36</b> 36" WF 36 x 12	194	36½	12⅝	1⅛	1 7/16	13/16	32¼	2⅞	38½	.75	5.0	
	182	36⅜	12⅝	1	1 5/16	¾	32¼	2⅞	38⅝	.75	5.0	
	170	36⅜	12	15/16	1¼	1 1/16	32¼	2⅞	38⅞	.75	5.0	
	160	36	12	7/8	1 3/16	1 1/16	32¼	2 1/16	38	.75	5.0	
	150	35⅞	12	13/16	1 1/16	5/8	32¼	2 1/16	37⅞	.75	5.0	
<b>*B33A</b> 33" WF 33 x 15¾	240	33½	15⅞	1 3/16	1 9/16	7/8	28⅝	2 9/16	37⅞	.90	5.0	
	220	33¼	15¾	1 1/16	1½	13/16	28⅝	2½	36⅞	.90	5.0	
	200	33	15¾	15/16	1 5/16	¾	28⅝	2 7/16	36⅞	.90	5.0	
<b>*B33</b> 33" WF 33 x 11½	152	33½	11⅝	15/16	1 3/16	5/8	29¾	1 15/16	35½	.70	5.0	
	141	33¼	11½	13/16	1⅛	5/8	29¾	1 15/16	35¼	.70	5.0	
	130	33⅜	11½	1 1/16	1	9/16	29¾	1 15/16	35⅞	.70	5.0	
<b>*B30A</b> 30" WF 30 x 15	210	30⅞	15⅞	1⅛	1½	13/16	25¾	2⅞	34	.85	5.0	
	190	30⅞	15	1	1⅜	¾	25¾	2 5/16	33¾	.85	5.0	
	172	29⅞	15	7/8	1¼	1 1/16	25¾	2¼	33½	.85	5.0	
<b>*B30</b> 30" WF 30 x 10½	132	30¼	10½	7/8	1⅛	5/8	26⅞	1⅞	32⅞	.65	5.0	
	124	30⅞	10½	13/16	1 1/16	5/8	26⅞	1 13/16	31⅞	.65	5.0	
	116	30	10½	¾	1	9/16	26⅞	1 13/16	31¾	.65	5.0	
	108	29⅞	10½	5/8	7/8	9/16	26⅞	1 13/16	31⅞	.65	5.0	

\* These shapes have flange slope of 5 pct.

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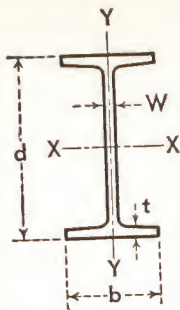
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# BETHLEHEM WIDE-FLANGE SHAPES

*Theoretical Dimensions and Properties for Designing*

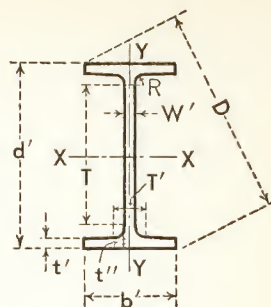
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
				b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
	lb	in. <sup>2</sup>	in.	in.	in.	in.						
<b>*B27A</b>	177	52.10	27.31	14.090	1.190	.725	6728.6	492.8	11.36	518.9	73.7	3.16
27" WF	160	47.04	27.08	14.023	1.075	.658	6018.6	444.5	11.31	458.0	65.3	3.12
27 x 14	145	42.68	26.88	13.965	.975	.600	5414.3	402.9	11.26	406.9	58.3	3.09
<b>*B27</b>	114	33.53	27.28	10.070	.932	.570	4080.5	299.2	11.03	149.6	29.7	2.11
27" WF	102	30.01	27.07	10.018	.827	.518	3604.1	266.3	10.96	129.5	25.9	2.08
27 x 10	94	27.65	26.91	9.990	.747	.490	3266.7	242.8	10.87	115.1	23.0	2.04
<b>*B24B</b>	160	47.04	24.72	14.091	1.135	.656	5110.3	413.5	10.42	492.6	69.9	3.23
24" WF	145	42.62	24.49	14.043	1.020	.608	4561.0	372.5	10.34	434.3	61.8	3.19
24 x 14	130	38.21	24.25	14.000	.900	.565	4009.5	330.7	10.24	375.2	53.6	3.13
<b>*B24A</b>	120	35.29	24.31	12.088	.930	.556	3635.3	299.1	10.15	254.0	42.0	2.68
24" WF	110	32.36	24.16	12.042	.855	.510	3315.0	274.4	10.12	229.1	38.0	2.66
24 x 12	100	29.43	24.00	12.000	.775	.468	2987.3	248.9	10.08	203.5	33.9	2.63
<b>*B24</b>	94	27.63	24.29	9.061	.872	.516	2683.0	220.9	9.85	102.2	22.6	1.92
24" WF	84	24.71	24.09	9.015	.772	.470	2364.3	196.3	9.78	88.3	19.6	1.89
24 x 9	76	22.37	23.91	8.985	.682	.440	2096.4	175.4	9.68	76.5	17.0	1.85
<b>*B21B</b>	142	41.76	21.46	13.132	1.095	.659	3403.1	317.2	9.03	385.9	58.8	3.04
21" WF	127	37.34	21.24	13.061	.985	.588	3017.2	284.1	8.99	338.6	51.8	3.01
21 x 13	112	32.93	21.00	13.000	.865	.527	2620.6	249.6	8.92	289.7	44.6	2.96
<b>*B21A</b>	96	28.21	21.14	9.038	.935	.575	2088.9	197.6	8.60	109.3	24.2	1.97
21" WF	82	24.10	20.86	8.962	.795	.499	1752.4	168.0	8.53	89.6	20.0	1.93
21 x 9												
<b>*B21</b>	73	21.46	21.24	8.295	.740	.455	1600.3	150.7	8.64	66.2	16.0	1.76
21" WF	68	20.02	21.13	8.270	.685	.430	1478.3	139.9	8.59	60.4	14.6	1.74
21 x 8 1/4	62	18.23	20.99	8.240	.615	.400	1326.8	126.4	8.53	53.1	12.9	1.71

\* These shapes have flange slope of 5 pct, and flange thicknesses shown are average thicknesses.



# BETHLEHEM WIDE-FLANGE SHAPES

*Approximate Dimensions for Detailing*



Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root						
	lb	in.	b'	t'	t''	W'	T	T'	D	R	pct
<b>*B 27A</b>	177	27 1/4	14 1/8	1	1 3/8	3/4	23	2 1/4	30 3/4	.80	5.0
27" WF	160	27 1/8	14	7/8	1 1/4	1 1/16	23	2 3/16	30 1/2	.80	5.0
27 x 14	145	26 7/8	14	1 3/16	1 1/8	5/8	23	2 1/8	30 3/8	.80	5.0
<b>*B 27</b>	114	27 1/4	10 1/8	1 3/16	1 1/16	9/16	24	1 1 1/16	29 1/8	.60	5.0
27" WF	102	27 1/8	10	1 1/16	1 5/16	1/2	24	1 1 1/16	28 7/8	.60	5.0
27 x 10	94	26 7/8	10	5/8	7/8	1/2	24	1 3/4	28 3/4	.60	5.0
<b>*B 24B</b>	160	24 3/4	14 1/8	1 5/16	1 5/16	1 1/16	20 3/4	2	28 1/2	.70	5.0
24" WF	145	24 1/2	14	7/8	1 3/16	5/8	20 3/4	1 15/16	28 1/4	.70	5.0
24 x 14	130	24 1/4	14	3/4	1 1/16	9/16	20 3/4	1 7/8	28	.70	5.0
<b>*B 24A</b>	120	24 1/4	12 1/8	1 3/16	1 1/16	9/16	20 7/8	1 13/16	27 1/8	.65	5.0
24" WF	110	24 1/8	12	1 1/16	1	1/2	20 7/8	1 3/4	27	.65	5.0
24 x 12	100	24	12	5/8	1 5/16	1/2	20 7/8	1 1 1/16	26 7/8	.65	5.0
<b>*B 24</b>	94	24 1/4	9	3/4	1	1/2	21 3/8	1 7/16	25 7/8	.50	5.0
24" WF	84	24 1/8	9	1 1/16	7/8	1/2	21 3/8	1 7/16	25 3/4	.50	5.0
24 x 9	76	23 7/8	9	9/16	1 3/16	7/16	21 3/8	1 3/8	25 5/8	.50	5.0
<b>*B 21B</b>	142	21 1/2	13 3/8	1 5/16	1 1/4	1 1/16	17 3/4	1 7/8	25 1/4	.65	5.0
21" WF	127	21 1/4	13	1 3/16	1 1/8	9/16	17 3/4	1 13/16	25	.65	5.0
21 x 13	112	21	13	1 1/16	1	9/16	17 3/4	1 3/4	24 3/4	.65	5.0
<b>*B 21A</b>	96	21 1/8	9	1 3/16	1 1/16	9/16	18	1 5/8	23	.55	5.0
21" WF	82	20 7/8	9	1 1/16	1 5/16	1/2	18	1 9/16	22 3/4	.55	5.0
21 x 9											
<b>*B 21</b>	73	21 1/4	8 1/4	5/8	1 3/16	1/2	18 5/8	1 3/8	22 7/8	.50	5.0
21" WF	68	21 1/8	8 1/4	9/16	3/4	7/16	18 5/8	1 3/8	22 3/4	.50	5.0
21 x 8 1/4	62	21	8 1/4	1/2	1 1/16	3/8	18 5/8	1 3/8	22 5/8	.50	5.0

\* These shapes have flange slope of 5 pct.

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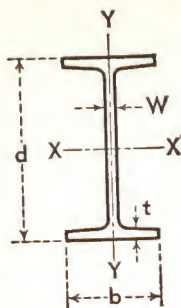
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# BETHLEHEM WIDE-FLANGE SHAPES

*Theoretical Dimensions and Properties for Designing*

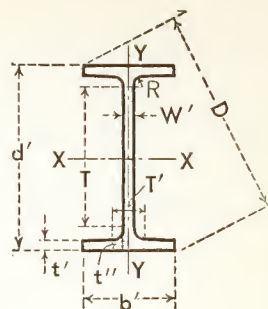
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
				b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>*B 18B</b> 18" WF 18 x 11 <sup>3</sup> / <sub>4</sub>	114	33.51	18.48	11.833	.991	.595	2033.8	220.1	7.79	255.6	43.2	2.76
	105	30.86	18.32	11.792	.911	.554	1852.5	202.2	7.75	231.0	39.2	2.73
	96	28.22	18.16	11.750	.831	.512	1674.7	184.4	7.70	206.8	35.2	2.71
<b>*B 18A</b> 18" WF 18 x 8 <sup>3</sup> / <sub>4</sub>	85	24.97	18.32	8.838	.911	.526	1429.9	156.1	7.57	99.4	22.5	2.00
	77	22.63	18.16	8.787	.831	.475	1286.8	141.7	7.54	88.6	20.2	1.98
	70	20.56	18.00	8.750	.751	.438	1153.9	128.2	7.49	78.5	17.9	1.95
	64	18.80	17.87	8.715	.686	.403	1045.8	117.0	7.46	70.3	16.1	1.93
<b>*B 18</b> 18" WF 18 x 7 <sup>1</sup> / <sub>2</sub>	60	17.64	18.25	7.558	.695	.416	984.0	107.8	7.47	47.1	12.5	1.63
	55	16.19	18.12	7.532	.630	.390	889.9	98.2	7.41	42.0	11.1	1.61
	50	14.71	18.00	7.500	.570	.358	800.6	89.0	7.38	37.2	9.9	1.59
<b>*B 16B</b> 16" WF 16 x 11 <sup>1</sup> / <sub>2</sub>	96	28.22	16.32	11.533	.875	.535	1355.1	166.1	6.93	207.2	35.9	2.71
	88	25.87	16.16	11.502	.795	.504	1222.6	151.3	6.87	185.2	32.2	2.67
<b>*B 16A</b> 16" WF 16 x 8 <sup>1</sup> / <sub>2</sub>	78	22.92	16.32	8.586	.875	.529	1042.6	127.8	6.74	87.5	20.4	1.95
	71	20.86	16.16	8.543	.795	.486	936.9	115.9	6.70	77.9	18.2	1.93
	64	18.80	16.00	8.500	.715	.443	833.8	104.2	6.66	68.4	16.1	1.91
	58	17.04	15.86	8.464	.645	.407	746.4	94.1	6.62	60.5	14.3	1.88
<b>*B 16</b> 16" WF 16 x 7	50	14.70	16.25	7.073	.628	.380	655.4	80.7	6.68	34.8	9.8	1.54
	45	13.24	16.12	7.039	.563	.346	583.3	72.4	6.64	30.5	8.7	1.52
	40	11.77	16.00	7.000	.503	.307	515.5	64.4	6.62	26.5	7.6	1.50
	36	10.59	15.85	6.992	.428	.299	446.3	56.3	6.49	22.1	6.3	1.45

\* These shapes have flange slope of 5 pct, and flange thicknesses shown are average thicknesses.



# BETHLEHEM WIDE-FLANGE SHAPES

*Approximate Dimensions for Detailing*



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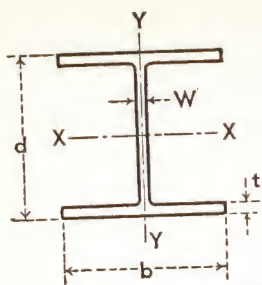
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Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root						
							d'				
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	
<b>*B 18B</b> 18" WF 18 x 11¾	114	18½	11⅞	⅞	1⅛	⅝	15⅞	1¾	22	.60	5.0
	105	18⅜	11¾	¾	1 ⅛/16	⅞/16	15⅞	1 ⅛/16	21⅞	.60	5.0
	96	18⅞	11¾	1 ⅛/16	1	½	15⅞	1⅝	21¾	.60	5.0
<b>*B 18A</b> 18" WF 18 x 8¾	85	18⅜	8⅞	1⅜/16	1	⅞/16	15⅜	1½	20⅜	.50	5.0
	77	18⅞	8¾	¾	1⅝/16	½	15⅜	1⅞/16	20⅞	.50	5.0
	70	18	8¾	⅝	⅞	⅞/16	15⅜	1⅝	20	.50	5.0
	64	17⅞	8¾	⅞/16	1⅜/16	⅞/16	15⅜	1⅝	20	.50	5.0
<b>*B 18</b> 18" WF 18 x 7½	60	18¼	7½	⅝	1⅜/16	⅞/16	15⅞	1⅜/16	19⅞	.40	5.0
	55	18⅞	7½	⅞/16	¾	⅝	15⅞	1⅞	19⅝	.40	5.0
	50	18	7½	½	1 ⅛/16	⅝	15⅞	1⅞	19½	.40	5.0
<b>*B 16B</b> 16" WF 16 x 11½	96	16⅜	11½	¾	1	⅞/16	13⅞	1 ⅛/16	20	.60	5.0
	88	16⅞	11½	⅝	1⅝/16	½	13⅞	1⅝	19⅞	.60	5.0
<b>*B 16A</b> 16" WF 16 x 8½	78	16⅜	8⅝	¾	1	⅞/16	13⅜	1½	18½	.50	5.0
	71	16⅞	8½	1 ⅛/16	⅞	½	13⅜	1⅞/16	18¼	.50	5.0
	64	16	8½	⅝	1⅜/16	⅞/16	13⅜	1⅝	18⅞	.50	5.0
	58	15⅞	8½	⅞/16	¾	⅞/16	13⅜	1⅝	18	.50	5.0
<b>*B 16</b> 16" WF 16 x 7	50	16¼	7⅞	⅞/16	1 ⅛/16	⅝	14	1⅞	17¾	.40	5.0
	45	16⅞	7	½	⅝	⅝	14	1⅞	17⅝	.40	5.0
	40	16	7	⅞/16	⅞/16	⅝/16	14	1 ⅛/16	17½	.40	5.0
	36	15⅞	7	⅝	½	⅝/16	14	1 ⅛/16	17⅝	.40	5.0

\* These shapes have flange slope of 5 pct.



# BETHLEHEM WIDE-FLANGE SHAPES

*Theoretical Dimensions and Properties for Designing*

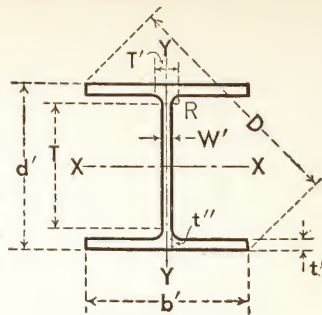
Section Number and Nominal Size	Weight per Foot	Area of Section A	Depth of Section d	Flange		Web Thickness W	AXIS X-X			AXIS Y-Y		
				Width b	Thick-ness t		I	S	r	I'	S'	r'
	lb	in. <sup>2</sup>	in.	in.	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>B14E</b> 14" WF 14 x 16	426	125.25	18.69	16.695	3.033	1.875	6610.3	707.4	7.26	2359.5	282.7	4.34
	398	116.98	18.31	16.590	2.843	1.770	6013.7	656.9	7.17	2169.7	261.6	4.31
	370	108.78	17.94	16.475	2.658	1.655	5454.2	608.1	7.08	1986.0	241.1	4.27
	342	100.59	17.56	16.365	2.468	1.545	4911.5	559.4	6.99	1806.9	220.8	4.24
	314	92.30	17.19	16.235	2.283	1.415	4399.4	511.9	6.90	1631.4	201.0	4.20
	287	84.37	16.81	16.130	2.093	1.310	3912.1	465.5	6.81	1466.5	181.8	4.17
	264	77.63	16.50	16.025	1.938	1.205	3526.0	427.4	6.74	1331.2	166.1	4.14
	246	72.33	16.25	15.945	1.813	1.125	3228.9	397.4	6.68	1226.6	153.9	4.12
	237	69.69	16.12	15.910	1.748	1.090	3080.9	382.2	6.65	1174.8	147.7	4.11
	228	67.06	16.00	15.865	1.688	1.045	2942.4	367.8	6.62	1124.8	141.8	4.10
	219	64.36	15.87	15.825	1.623	1.005	2798.2	352.6	6.59	1073.2	135.6	4.08
	211	62.07	15.75	15.800	1.563	.980	2671.4	339.2	6.56	1028.6	130.2	4.07
	202	59.39	15.63	15.750	1.503	.930	2538.8	324.9	6.54	979.7	124.4	4.06
	193	56.73	15.50	15.710	1.438	.890	2402.4	310.0	6.51	930.1	118.4	4.05
<b>B14F</b> 14" WF Column Core	184	54.07	15.38	15.660	1.378	.840	2274.8	295.8	6.49	882.7	112.7	4.04
	176	51.73	15.25	15.640	1.313	.820	2149.6	281.9	6.45	837.9	107.1	4.02
	167	49.09	15.12	15.600	1.248	.780	2020.8	267.3	6.42	790.2	101.3	4.01
	158	46.47	15.00	15.550	1.188	.730	1900.6	253.4	6.40	745.0	95.8	4.00
	150	44.08	14.88	15.515	1.128	.695	1786.9	240.2	6.37	702.5	90.6	3.99
	142	41.85	14.75	15.500	1.063	.680	1672.2	226.7	6.32	660.1	85.2	3.97
	320	94.12	16.81	16.710	2.093	1.890	4141.7	492.8	6.63	1635.1	195.7	4.17

All sections shown on this page have parallel-faced flanges.



# BETHLEHEM

## WIDE-FLANGE SHAPES



*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root		Web (Nominal)				
							T				
	lb	d'	b'	t'	t''	W'	T	T'	D	R	pct
B 14E 14" WF 14 x 16	426	18¾	16¾	3 1/16	3 1/16	1 7/8	11 3/8	3 1/16	25 1/8	.60	0
	398	18¼	16 5/8	2 13/16	2 13/16	1 13/16	11 3/8	3	24¾	.60	0
	370	18	16½	2 1 1/16	2 1 1/16	1 1 1/16	11 3/8	2 7/8	24 3/8	.60	0
	342	17½	16 3/8	2 7/16	2 7/16	1 9/16	11 3/8	2¾	24	.60	0
	314	17¼	16¼	2 5/16	2 5/16	1 7/16	11 3/8	2 5/8	23¾	.60	0
	287	16¾	16 1/8	2 1/16	2 1/16	1 5/16	11 3/8	2½	23 3/8	.60	0
	264	16½	16	1 15/16	1 15/16	1¼	11 3/8	2 3/8	23	.60	0
	246	16¼	16	1 13/16	1 13/16	1 1/8	11 3/8	2 5/16	22 7/8	.60	0
	237	16 1/8	15 7/8	1¾	1¾	1 1/8	11 3/8	2 5/16	22¾	.60	0
	228	16	15 7/8	1 1 1/16	1 1 1/16	1 1/16	11 3/8	2¼	22 5/8	.60	0
	219	15 7/8	15 7/8	1 5/8	1 5/8	1	11 3/8	2 3/16	22½	.60	0
	211	15¾	15¾	1 9/16	1 9/16	1	11 3/8	2 3/16	22 3/8	.60	0
	202	15 5/8	15¾	1½	1½	1 5/16	11 3/8	2 1/8	22¼	.60	0
	193	15½	15¾	1 7/16	1 7/16	7/8	11 3/8	2 1/16	22 1/8	.60	0
	184	15 3/8	15 5/8	1 3/8	1 3/8	7/8	11 3/8	2	22	.60	0
	176	15¼	15 5/8	1 5/16	1 5/16	13/16	11 3/8	2	21 7/8	.60	0
	167	15 1/8	15 5/8	1¼	1¼	13/16	11 3/8	2	21¾	.60	0
	158	15	15½	1 3/16	1 3/16	¾	11 3/8	1 15/16	21 5/8	.60	0
150	14 7/8	15½	1 1/8	1 1/8	1 1/16	11 3/8	1 7/8	21½	.60	0	
142	14¾	15½	1 1/16	1 1/16	1 1/16	11 3/8	1 7/8	21½	.60	0	
B 14F 14" WF Column Core	320	16¾	16¾	2 1/16	2 1/16	1 7/8	11 3/8	3 1/16	23¾	.60	0

All sections shown on this page have parallel-faced flanges.

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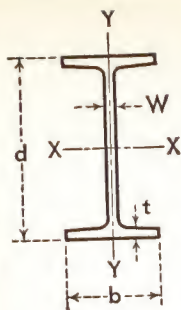
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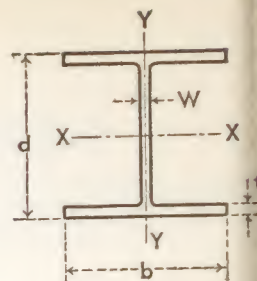
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# BETHLEHEM WIDE-FLANGE SHAPES

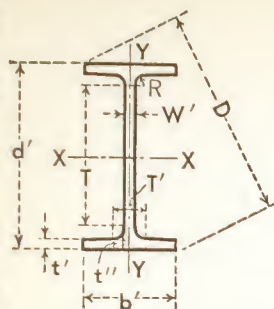


*Theoretical Dimensions and Properties for Designing*

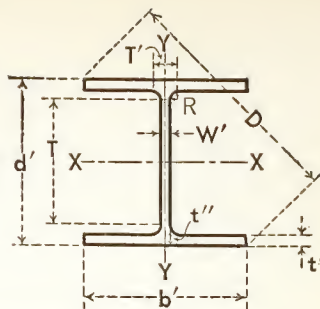
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
				b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>B 14D</b> 14" WF 14 x 14½	136	39.98	14.75	14.740	1.063	.660	1593.0	216.0	6.31	567.7	77.0	3.77
	127	37.33	14.62	14.690	.998	.610	1476.7	202.0	6.29	527.6	71.8	3.76
	119	34.99	14.50	14.650	.938	.570	1373.1	189.4	6.26	491.8	67.1	3.75
	111	32.65	14.37	14.620	.873	.540	1266.5	176.3	6.23	454.9	62.2	3.73
	103	30.26	14.25	14.575	.813	.495	1165.8	163.6	6.21	419.7	57.6	3.72
	95	27.94	14.12	14.545	.748	.465	1063.5	150.6	6.17	383.7	52.8	3.71
	87	25.56	14.00	14.500	.688	.420	966.9	138.1	6.15	349.7	48.2	3.70
<b>B 14C</b> 14" WF 14 x 12	84	24.71	14.18	12.023	.778	.451	928.4	130.9	6.13	225.5	37.5	3.02
	78	22.94	14.06	12.000	.718	.428	851.2	121.1	6.09	206.9	34.5	3.00
<b>B 14B</b> 14" WF 14 x 10	74	21.76	14.19	10.072	.783	.450	796.8	112.3	6.05	133.5	26.5	2.48
	68	20.00	14.06	10.040	.718	.418	724.1	103.0	6.02	121.2	24.1	2.46
	61	17.94	13.91	10.000	.643	.378	641.5	92.2	5.98	107.3	21.5	2.45
<b>B 14A</b> 14" WF 14 x 8	53	15.59	13.94	8.062	.658	.370	542.1	77.8	5.90	57.5	14.3	1.92
	48	14.11	13.81	8.031	.593	.339	484.9	70.2	5.86	51.3	12.8	1.91
	43	12.65	13.68	8.000	.528	.308	429.0	62.7	5.82	45.1	11.3	1.89
<b>*B 14</b> 14" WF 14 x 6¾	38	11.17	14.12	6.776	.513	.313	385.3	54.6	5.87	24.6	7.3	1.49
	34	10.00	14.00	6.750	.453	.287	339.2	48.5	5.83	21.3	6.3	1.46
	30	8.81	13.86	6.733	.383	.270	289.6	41.8	5.73	17.5	5.2	1.41

\* These shapes have flange slope of 5 pct, and flange thicknesses shown are average thicknesses.  
All other sections shown on this page have parallel-faced flanges.





# BETHLEHEM WIDE-FLANGE SHAPES



*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent Web (Nominal)	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root						
	lb	d'	b'	t'	t''	W'	T	T'	D	R	pct
<b>B 14D</b> 14" WF 14 x 14½	136	14¾	14¾	1 1/16	1 1/16	1 1/16	11 3/8	1 7/8	20 7/8	.60	0
	127	14 5/8	14¾	1	1	5/8	11 3/8	1 13/16	20 3/4	.60	0
	119	14½	14 5/8	15/16	15/16	9/16	11 3/8	1 3/4	20 5/8	.60	0
	111	14 3/8	14 5/8	7/8	7/8	9/16	11 3/8	1 3/4	20 1/2	.60	0
	103	14¼	14 5/8	13/16	13/16	1/2	11 3/8	1 11/16	20 1/2	.60	0
	95	14 1/8	14½	3/4	3/4	1/2	11 3/8	1 11/16	20 1/4	.60	0
	87	14	14½	11/16	11/16	7/16	11 3/8	1 5/8	20 1/4	.60	0
<b>B 14C</b> 14" WF 14 x 12	84	14 1/8	12	3/4	3/4	7/16	11 3/8	1 5/8	18 5/8	.60	0
	78	14	12	11/16	11/16	7/16	11 3/8	1 5/8	18 1/2	.60	0
<b>B 14B</b> 14" WF 14 x 10	74	14¼	10 5/8	13/16	13/16	7/16	11 3/8	1 5/8	17 1/2	.60	0
	68	14	10	11/16	11/16	7/16	11 3/8	1 5/8	17 1/4	.60	0
	61	13 7/8	10	5/8	5/8	3/8	11 3/8	1 9/16	17 1/8	.60	0
<b>B 14A</b> 14" WF 14 x 8	53	14	8	11/16	11/16	3/8	11 3/8	1 9/16	16 1/8	.60	0
	48	13 3/4	8	9/16	9/16	3/8	11 3/8	1 9/16	16	.60	0
	43	13 5/8	8	1/2	1/2	5/16	11 3/8	1 1/2	15 7/8	.60	0
<b>*B 14</b> 14" WF 14 x 6¾	38	14 1/8	6¾	7/16	5/8	5/16	12 1/8	1 1/16	15¾	.40	5.0
	34	14	6¾	3/8	9/16	5/16	12 1/8	1 1/16	15 5/8	.40	5.0
	30	13 7/8	6¾	5/16	7/16	5/16	12 1/8	1	15 1/2	.40	5.0

\* These shapes have flange slope of 5 pct. All other sections shown on this page have parallel-faced flanges.

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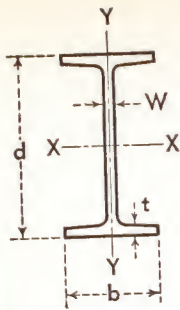
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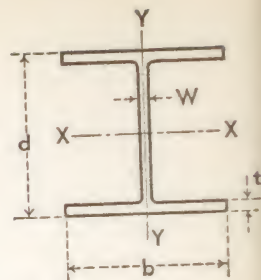
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# BETHLEHEM WIDE-FLANGE SHAPES

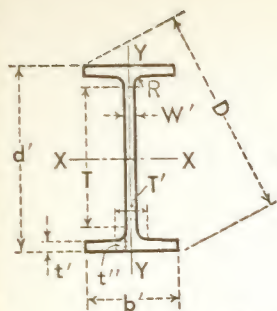


*Theoretical Dimensions and Properties for Designing*

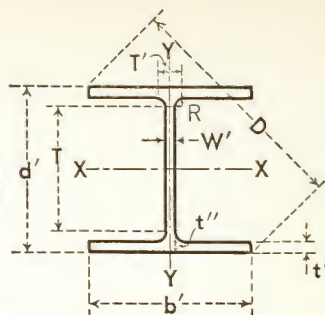
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>B 12C</b> 12" WF 12 x 12	190	55.86	14.38	12.670	1.736	1.060	1892.5	263.2	5.82	589.7	93.1	3.25
	161	47.38	13.88	12.515	1.486	.905	1541.8	222.2	5.70	486.2	77.7	3.20
	133	39.11	13.38	12.365	1.236	.755	1221.2	182.5	5.59	389.9	63.1	3.16
	120	35.31	13.12	12.320	1.106	.710	1071.7	163.4	5.51	345.1	56.0	3.13
	106	31.19	12.88	12.230	.986	.620	930.7	144.5	5.46	300.9	49.2	3.11
	99	29.09	12.75	12.190	.921	.580	858.5	134.7	5.43	278.2	45.7	3.09
	92	27.06	12.62	12.155	.856	.545	788.9	125.0	5.40	256.4	42.2	3.08
	85	24.98	12.50	12.105	.796	.495	723.3	115.7	5.38	235.5	38.9	3.07
	79	23.22	12.38	12.080	.736	.470	663.0	107.1	5.34	216.4	35.8	3.05
	72	21.16	12.25	12.040	.671	.430	597.4	97.5	5.31	195.3	32.4	3.04
<b>B 12B</b> 12" WF 12 x 10	65	19.11	12.12	12.000	.606	.390	533.4	88.0	5.28	174.6	29.1	3.02
	58	17.06	12.19	10.014	.641	.359	476.1	78.1	5.28	107.4	21.4	2.51
<b>B 12A</b> 12" WF 12 x 8	53	15.59	12.06	10.000	.576	.345	426.2	70.7	5.23	96.1	19.2	2.48
	50	14.71	12.19	8.077	.641	.371	394.5	64.7	5.18	56.4	14.0	1.96
<b>*B 12</b> 12" WF 12 x 6½	45	13.24	12.06	8.042	.576	.336	350.8	58.2	5.15	50.0	12.4	1.94
	40	11.77	11.94	8.000	.516	.294	310.1	51.9	5.13	44.1	11.0	1.94
<b>*B 12</b> 12" WF 12 x 6½	36	10.59	12.24	6.565	.540	.305	280.8	45.9	5.15	23.7	7.2	1.50
	31	9.12	12.09	6.525	.465	.265	238.4	39.4	5.11	19.8	6.1	1.47
	27	7.97	11.96	6.500	.400	.240	204.1	34.1	5.06	16.6	5.1	1.44

\* These shapes have flange slope of 5 pct, and flange thicknesses shown are average thicknesses.  
All other sections shown on this page have parallel-faced flanges.





# BETHLEHEM WIDE-FLANGE SHAPES



*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root						
							d'				
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	
B 12C 12" WF 12 x 12	190	14 <sup>3</sup> / <sub>8</sub>	12 <sup>5</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>4</sub>	19 <sup>1</sup> / <sub>4</sub>	.60	0
	161	13 <sup>7</sup> / <sub>8</sub>	12 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>5</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>8</sub>	18 <sup>3</sup> / <sub>4</sub>	.60	0
	133	13 <sup>3</sup> / <sub>8</sub>	12 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	<sup>3</sup> / <sub>4</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>15</sup> / <sub>16</sub>	18 <sup>1</sup> / <sub>4</sub>	.60	0
	120	13 <sup>1</sup> / <sub>8</sub>	12 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	<sup>3</sup> / <sub>4</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>15</sup> / <sub>16</sub>	18	.60	0
	106	12 <sup>7</sup> / <sub>8</sub>	12 <sup>1</sup> / <sub>4</sub>	1	1	<sup>5</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>16</sub>	17 <sup>7</sup> / <sub>8</sub>	.60	0
	99	12 <sup>3</sup> / <sub>4</sub>	12 <sup>1</sup> / <sub>4</sub>	<sup>15</sup> / <sub>16</sub>	<sup>15</sup> / <sub>16</sub>	<sup>5</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	17 <sup>3</sup> / <sub>4</sub>	.60	0
	92	12 <sup>5</sup> / <sub>8</sub>	12 <sup>1</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>9</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	17 <sup>1</sup> / <sub>2</sub>	.60	0
	85	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>8</sub>	<sup>13</sup> / <sub>16</sub>	<sup>13</sup> / <sub>16</sub>	<sup>1</sup> / <sub>2</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>11</sup> / <sub>16</sub>	17 <sup>1</sup> / <sub>2</sub>	.60	0
	79	12 <sup>3</sup> / <sub>8</sub>	12 <sup>1</sup> / <sub>8</sub>	<sup>3</sup> / <sub>4</sub>	<sup>3</sup> / <sub>4</sub>	<sup>1</sup> / <sub>2</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>11</sup> / <sub>16</sub>	17 <sup>3</sup> / <sub>8</sub>	.60	0
72	12 <sup>1</sup> / <sub>4</sub>	12	<sup>11</sup> / <sub>16</sub>	<sup>11</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>4</sub>	<sup>15</sup> / <sub>8</sub>	17 <sup>1</sup> / <sub>4</sub>	.60	0	
65	12 <sup>1</sup> / <sub>8</sub>	12	<sup>5</sup> / <sub>8</sub>	<sup>5</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	<sup>19</sup> / <sub>16</sub>	17 <sup>1</sup> / <sub>8</sub>	.60	0	
B 12B 12" WF 12 x 10	58	12 <sup>1</sup> / <sub>4</sub>	10	<sup>5</sup> / <sub>8</sub>	<sup>5</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	<sup>19</sup> / <sub>16</sub>	15 <sup>7</sup> / <sub>8</sub>	.60	0
	53	12	10	<sup>9</sup> / <sub>16</sub>	<sup>9</sup> / <sub>16</sub>	<sup>3</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	<sup>19</sup> / <sub>16</sub>	15 <sup>5</sup> / <sub>8</sub>	.60	0
B 12A 12" WF 12 x 8	50	12 <sup>1</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>8</sub>	<sup>5</sup> / <sub>8</sub>	<sup>5</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	<sup>19</sup> / <sub>16</sub>	14 <sup>5</sup> / <sub>8</sub>	.60	0
	45	12	8	<sup>9</sup> / <sub>16</sub>	<sup>9</sup> / <sub>16</sub>	<sup>3</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	<sup>19</sup> / <sub>16</sub>	14 <sup>1</sup> / <sub>2</sub>	.60	0
	40	12	8	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>5</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	14 <sup>3</sup> / <sub>8</sub>	.60	0
*B 12 12" WF 12 x 6 <sup>1</sup> / <sub>2</sub>	36	12 <sup>1</sup> / <sub>4</sub>	6 <sup>5</sup> / <sub>8</sub>	<sup>7</sup> / <sub>16</sub>	<sup>5</sup> / <sub>8</sub>	<sup>5</sup> / <sub>16</sub>	10 <sup>3</sup> / <sub>8</sub>	1	14	.35	5.0
	31	12 <sup>1</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	<sup>3</sup> / <sub>8</sub>	<sup>9</sup> / <sub>16</sub>	<sup>1</sup> / <sub>4</sub>	10 <sup>3</sup> / <sub>8</sub>	<sup>15</sup> / <sub>16</sub>	13 <sup>3</sup> / <sub>4</sub>	.35	5.0
	27	12	6 <sup>1</sup> / <sub>2</sub>	<sup>5</sup> / <sub>16</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>4</sub>	10 <sup>3</sup> / <sub>8</sub>	<sup>15</sup> / <sub>16</sub>	13 <sup>5</sup> / <sub>8</sub>	.35	5.0

\* These shapes have flange slope of 5 pct.  
All other sections shown on this page have parallel-faced flanges.

**I**  
WF&BL

**I**  
BJ&BS

**I**  
STD

**[**  
STD  
ANGLES

**[**  
PILING

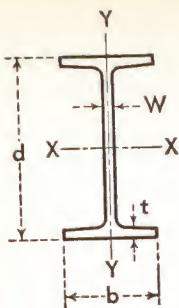
**T**  
TEES

**[**  
CAR & SHIP

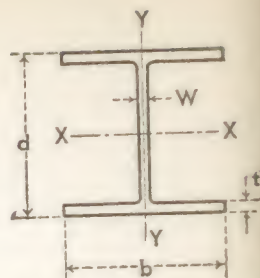
**[**  
BULB

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CAR

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ZEES



# BETHLEHEM WIDE-FLANGE SHAPES

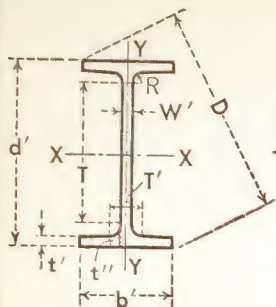


*Theoretical Dimensions and Properties for Designing*

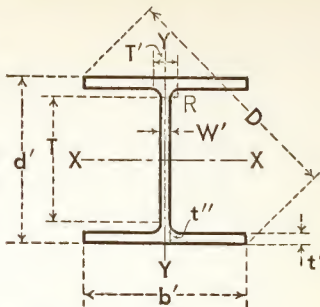
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
				b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>B 10B</b> 10" WF 10 x 10	112	32.92	11.38	10.415	1.248	.755	718.7	126.3	4.67	235.4	45.2	2.67
	100	29.43	11.12	10.345	1.118	.685	625.0	112.4	4.61	206.6	39.9	2.65
	89	26.19	10.88	10.275	.998	.615	542.4	99.7	4.55	180.6	35.2	2.63
	77	22.67	10.62	10.195	.868	.535	457.2	86.1	4.49	153.4	30.1	2.60
	72	21.18	10.50	10.170	.808	.510	420.7	80.1	4.46	141.8	27.9	2.59
	66	19.41	10.38	10.117	.748	.457	382.5	73.7	4.44	129.2	25.5	2.58
	60	17.66	10.25	10.075	.683	.415	343.7	67.1	4.41	116.5	23.1	2.57
	54	15.88	10.12	10.028	.618	.368	305.7	60.4	4.39	103.9	20.7	2.56
<b>B 10A</b> 10" WF 10 x 8	49	14.40	10.00	10.000	.558	.340	272.9	54.6	4.35	93.0	18.6	2.54
	45	13.24	10.12	8.022	.618	.350	248.6	49.1	4.33	53.2	13.3	2.00
	39	11.48	9.94	7.990	.528	.318	209.7	42.2	4.27	44.9	11.2	1.98
	33	9.71	9.75	7.964	.433	.292	170.9	35.0	4.20	36.5	9.2	1.94
<b>*B 10</b> 10" WF 10 x 5¾	29	8.53	10.22	5.799	.500	.289	157.3	30.8	4.29	15.2	5.2	1.34
	25	7.35	10.08	5.762	.430	.252	133.2	26.4	4.26	12.7	4.4	1.31
	21	6.19	9.90	5.750	.340	.240	106.3	21.5	4.14	9.7	3.4	1.25
<b>B 8B</b> 8" WF 8 x 8	67	19.70	9.00	8.287	.933	.575	271.8	60.4	3.71	88.6	21.4	2.12
	58	17.06	8.75	8.222	.808	.510	227.3	52.0	3.65	74.9	18.2	2.10
	48	14.11	8.50	8.117	.683	.405	183.7	43.2	3.61	60.9	15.0	2.08
	40	11.76	8.25	8.077	.558	.365	146.3	35.5	3.53	49.0	12.1	2.04
	35	10.30	8.12	8.027	.493	.315	126.5	31.1	3.50	42.5	10.6	2.03
	31	9.12	8.00	8.000	.433	.288	109.7	27.4	3.47	37.0	9.2	2.01
<b>B 8A</b> 8" WF 8 x 6½	28	8.23	8.06	6.540	.463	.285	97.8	24.3	3.45	21.6	6.6	1.62
	24	7.06	7.93	6.500	.398	.245	82.5	20.8	3.42	18.2	5.6	1.61
<b>*B 8</b> 8" WF 8 x 5¼	20	5.88	8.14	5.268	.378	.248	69.2	17.0	3.43	8.50	3.2	1.20
	17	5.00	8.00	5.250	.308	.230	56.4	14.1	3.36	6.72	2.6	1.16

\* These shapes have flange slope of 5 pct, and flange thicknesses shown are average thicknesses.  
All other sections shown on this page have parallel-faced flanges.





# BETHLEHEM WIDE-FLANGE SHAPES



*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent		Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root		Web Thickness (Nominal)	Distance (Nominal)				
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.		pct
B 10B 10" WF 10 x 10	112	11 <sup>3</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	<sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	15 <sup>1</sup> / <sub>2</sub>	.50	0	
	100	11 <sup>1</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	15 <sup>1</sup> / <sub>4</sub>	.50	0	
	89	10 <sup>7</sup> / <sub>8</sub>	10 <sup>1</sup> / <sub>4</sub>	1	1	<sup>5</sup> / <sub>8</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>	15	.50	0	
	77	10 <sup>5</sup> / <sub>8</sub>	10 <sup>1</sup> / <sub>4</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>9</sup> / <sub>16</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>9</sup> / <sub>16</sub>	14 <sup>3</sup> / <sub>4</sub>	.50	0	
	72	10 <sup>1</sup> / <sub>2</sub>	10 <sup>3</sup> / <sub>8</sub>	<sup>13</sup> / <sub>16</sub>	<sup>13</sup> / <sub>16</sub>	<sup>1</sup> / <sub>2</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	14 <sup>5</sup> / <sub>8</sub>	.50	0	
	66	10 <sup>3</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>4</sub>	<sup>3</sup> / <sub>4</sub>	<sup>7</sup> / <sub>16</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>16</sub>	14 <sup>1</sup> / <sub>2</sub>	.50	0	
	60	10 <sup>1</sup> / <sub>4</sub>	10 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>16</sub>	14 <sup>3</sup> / <sub>8</sub>	.50	0	
	54	10 <sup>1</sup> / <sub>8</sub>	10	<sup>5</sup> / <sub>8</sub>	<sup>5</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>4</sub>	.50	0	
49	10	10	<sup>9</sup> / <sub>16</sub>	<sup>9</sup> / <sub>16</sub>	<sup>3</sup> / <sub>8</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>16</sub>	14 <sup>1</sup> / <sub>8</sub>	.50	0		
B 10A 10" WF 10 x 8	45	10 <sup>1</sup> / <sub>8</sub>	8	<sup>5</sup> / <sub>8</sub>	<sup>5</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	13	.50	0	
	39	10	8	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>5</sup> / <sub>16</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>16</sub>	12 <sup>7</sup> / <sub>8</sub>	.50	0	
	33	9 <sup>3</sup> / <sub>4</sub>	8	<sup>7</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	<sup>5</sup> / <sub>16</sub>	7 <sup>7</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>16</sub>	12 <sup>5</sup> / <sub>8</sub>	.50	0	
*B 10 10" WF 10 x 5 <sup>3</sup> / <sub>4</sub>	29	10 <sup>1</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	<sup>7</sup> / <sub>16</sub>	<sup>9</sup> / <sub>16</sub>	<sup>5</sup> / <sub>16</sub>	8 <sup>1</sup> / <sub>2</sub>	<sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	.30	5.0	
	25	10 <sup>1</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>4</sub>	<sup>3</sup> / <sub>8</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	<sup>13</sup> / <sub>16</sub>	11 <sup>5</sup> / <sub>8</sub>	.30	5.0	
	21	9 <sup>7</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>4</sub>	<sup>1</sup> / <sub>4</sub>	<sup>7</sup> / <sub>16</sub>	<sup>1</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	<sup>13</sup> / <sub>16</sub>	11 <sup>1</sup> / <sub>2</sub>	.30	5.0	
B 8B 8" WF 8 x 8	67	9	8 <sup>1</sup> / <sub>4</sub>	<sup>15</sup> / <sub>16</sub>	<sup>15</sup> / <sub>16</sub>	<sup>9</sup> / <sub>16</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	12 <sup>1</sup> / <sub>4</sub>	.40	0	
	58	8 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>4</sub>	<sup>13</sup> / <sub>16</sub>	<sup>13</sup> / <sub>16</sub>	<sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>16</sub>	12	.40	0	
	48	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>16</sub>	11 <sup>7</sup> / <sub>8</sub>	.40	0	
	40	8 <sup>1</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>8</sub>	<sup>9</sup> / <sub>16</sub>	<sup>9</sup> / <sub>16</sub>	<sup>3</sup> / <sub>8</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>16</sub>	11 <sup>5</sup> / <sub>8</sub>	.40	0	
	35	8 <sup>1</sup> / <sub>8</sub>	8	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>5</sup> / <sub>16</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>2</sub>	.40	0	
	31	8	8	<sup>7</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	<sup>5</sup> / <sub>16</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	11 <sup>3</sup> / <sub>8</sub>	.40	0	
B 8A 8" WF 8 x 6 <sup>1</sup> / <sub>2</sub>	28	8	6 <sup>1</sup> / <sub>2</sub>	<sup>7</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	<sup>5</sup> / <sub>16</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	10 <sup>1</sup> / <sub>2</sub>	.40	0	
	24	7 <sup>7</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>1</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	10 <sup>1</sup> / <sub>4</sub>	.40	0	
*B 8 8" WF 8 x 5 <sup>1</sup> / <sub>4</sub>	20	8 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>4</sub>	<sup>5</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	<sup>1</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	<sup>13</sup> / <sub>16</sub>	9 <sup>3</sup> / <sub>4</sub>	.30	5.0	
	17	8	5 <sup>1</sup> / <sub>4</sub>	<sup>1</sup> / <sub>4</sub>	<sup>3</sup> / <sub>8</sub>	<sup>1</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	<sup>13</sup> / <sub>16</sub>	9 <sup>5</sup> / <sub>8</sub>	.30	5.0	

\* These shapes have flange slope of 5 pct.  
All other sections shown on this page have parallel-faced flanges.

**I**  
WF&BL

**I**  
BJ&BS

**I**  
STD

**[**  
STD

**L**  
ANGLES

**]**  
PILING

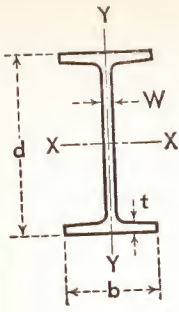
**T**  
TEES

**[**  
CAR & SHIP

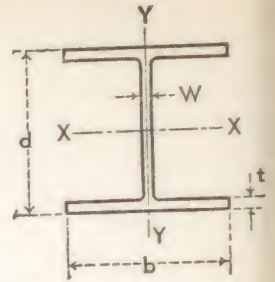
**L**  
BULB

**]**  
CAR

**]**  
ZEES



# BETHLEHEM LIGHT BEAMS LIGHT COLUMNS



*Theoretical Dimensions and Properties for Designing*

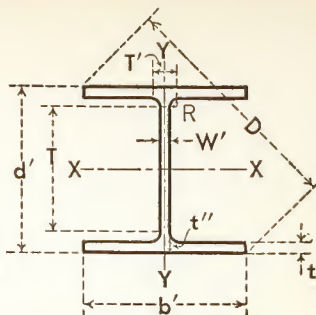
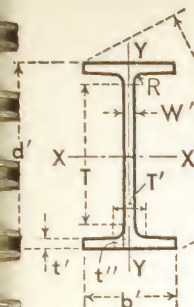
Section Number and Nominal Size	Weight per Foot	Area of Section A	Depth of Section d	Flange		Web Thickness W	AXIS X-X			AXIS Y-Y		
				Width	Thickness		I	S	r	I'	S'	r'
				b	t		in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
†B 12L 12" BL 12 x 4	22	6.47	12.31	4.030	.424	.260	155.7	25.3	4.91	4.55	2.26	.84
	19	5.62	12.16	4.010	.349	.240	130.1	21.4	4.81	3.67	1.83	.81
	16½	4.86	12.00	4.000	.269	.230	105.3	17.5	4.65	2.79	1.39	.76
†B 10L 10" BL 10 x 4	19	5.61	10.25	4.020	.394	.250	96.2	18.8	4.14	4.19	2.08	.86
	17	4.98	10.12	4.010	.329	.240	81.8	16.2	4.05	3.45	1.72	.83
	15	4.40	10.00	4.000	.269	.230	68.8	13.8	3.95	2.79	1.39	.80
†B 8L 8" BL 8 x 4	15	4.43	8.12	4.015	.314	.245	48.0	11.8	3.29	3.30	1.65	.86
	13	3.83	8.00	4.000	.254	.230	39.5	9.88	3.21	2.62	1.31	.83
†B 6L 6" BL 6 x 4	16	4.72	6.25	4.030	.404	.260	31.7	10.1	2.59	4.32	2.14	.96
	12	3.53	6.00	4.000	.279	.230	21.7	7.24	2.48	2.89	1.44	.90
B 6 6" WF 6 x 6	25	7.37	6.37	6.080	.456	.320	53.5	16.8	2.69	17.1	5.6	1.52
	20	5.90	6.20	6.018	.367	.258	41.7	13.4	2.66	13.3	4.4	1.50
	15.5	4.62	6.00	6.000	.269	.240	30.3	10.1	2.56	9.69	3.2	1.45
B 5 5" WF 5 x 5	18.5	5.45	5.12	5.025	.420	.265	25.4	9.94	2.16	8.89	3.54	1.28
	16	4.70	5.00	5.000	.360	.240	21.3	8.53	2.13	7.51	3.00	1.26

† These shapes have flange slope of 2 pct, and flange thicknesses shown are average thicknesses.  
All other sections shown on this page have parallel-faced flanges.



# BETHLEHEM LIGHT BEAMS LIGHT COLUMNS

*Approximate Dimensions for Detailing*



**I**  
WF&BL

**I**  
BJ&BS

**I**  
STD

**[**  
STD

**L**  
ANGLES

**┐**  
PILING

**T**  
TEES

**[**  
CAR & SHIP

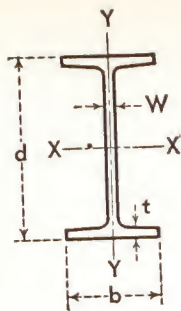
**L**  
BULB

**┐**  
CAR

**┐**  
ZEES

Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent		Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root		Web (Nominal)	T				
	lb	in.	b'	t'	t''	W'	T	T'	D	R	pct	
†B 12L	22	12¼	4	¾	7/16	¼	10¾	7/8	13	.30	2.0	
12" BL	19	12⅝	4	5/16	¾	¼	10¾	13/16	12¾	.30	2.0	
12 x 4	16½	12	4	¼	5/16	¼	10¾	13/16	12⅝	.30	2.0	
†B 10L	19	10¼	4	¾	7/16	¼	8⅞	13/16	11	.30	2.0	
10" BL	17	10⅝	4	5/16	¾	¼	8⅞	13/16	10⅞	.30	2.0	
10 x 4	15	10	4	¼	5/16	¼	8⅞	13/16	10¾	.30	2.0	
†B 8L	15	8⅝	4	5/16	5/16	¼	6⅞	13/16	9	.30	2.0	
8" BL	13	8	4	¼	¼	¼	6⅞	13/16	9	.30	2.0	
8 x 4												
†B 6L	16	6¼	4	¾	7/16	¼	4⅞	¾	7⅞	.25	2.0	
6" BL	12	6	4	¼	5/16	¼	4⅞	¾	7¼	.25	2.0	
6 x 4												
B 6	25	6⅝	6	½	½	5/16	4⅞	15/16	8⅞	.30	0	
6" WF	20	6¼	6	¾	¾	¼	4⅞	7/8	8⅝	.30	0	
6 x 6	15.5	6	6	¼	¼	¼	4⅞	13/16	8½	.30	0	
B 5	18.5	5⅝	5	7/16	7/16	¼	3 1/16	7/8	7⅞	.30	0	
5" WF	16	5	5	¾	¾	¼	3 1/16	13/16	7	.30	0	
5 x 5												

† These shapes have flange slope of 2 pct.  
All other sections shown on this page have parallel-faced flanges.



# BETHLEHEM JOISTS and STANCHIONS

*Theoretical Dimensions and Properties for Designing*

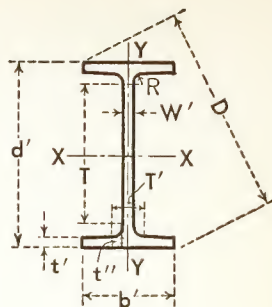
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
†BJ 12 12" BJ 12 x 4	14	4.14	11.91	3.970	.224	.200	88.2	14.8	4.61	2.25	1.13	.74
†BJ 10 10" BJ 10 x 4	11½	3.39	9.87	3.950	.204	.180	51.9	10.5	3.92	2.01	1.02	.77
†BJ 8 8" BJ 8 x 4	10	2.95	7.90	3.940	.204	.170	30.8	7.79	3.23	1.99	1.01	.82
†BJ 6 6" BJ 6 x 4	8½	2.50	5.83	3.940	.194	.170	14.8	5.07	2.43	1.89	.96	.87
BS 5 5" BS 5 x 5	18.9	5.47	5.00	5.000	.417	.313	23.8	9.5	2.08	7.80	3.10	1.20
†BS 4 4" BS 4 x 4	13	3.82	4.16	4.060	.345	.280	11.3	5.45	1.72	3.76	1.85	.99

† These shapes have flange slope of 2 pct, and flange thicknesses shown are average thicknesses.



# BETHLEHEM JOISTS and STANCHIONS

*Approximate Dimensions for Detailing*



Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root		Web (Nominal)				
							d'				
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	
†BJ 12 12" BJ 12 x 4	14	11 <sup>7</sup> / <sub>8</sub>	4	<sup>3</sup> / <sub>16</sub>	<sup>1</sup> / <sub>4</sub>	<sup>3</sup> / <sub>16</sub>	10 <sup>3</sup> / <sub>4</sub>	<sup>13</sup> / <sub>16</sub>	12 <sup>1</sup> / <sub>2</sub>	.30	2.0
†BJ 10 10" BJ 10 x 4	11 <sup>1</sup> / <sub>2</sub>	9 <sup>7</sup> / <sub>8</sub>	4	<sup>3</sup> / <sub>16</sub>	<sup>1</sup> / <sub>4</sub>	<sup>3</sup> / <sub>16</sub>	8 <sup>7</sup> / <sub>8</sub>	<sup>3</sup> / <sub>4</sub>	10 <sup>5</sup> / <sub>8</sub>	.30	2.0
†BJ 8 8" BJ 8 x 4	10	7 <sup>7</sup> / <sub>8</sub>	4	<sup>3</sup> / <sub>16</sub>	<sup>1</sup> / <sub>4</sub>	<sup>3</sup> / <sub>16</sub>	6 <sup>7</sup> / <sub>8</sub>	<sup>3</sup> / <sub>4</sub>	8 <sup>7</sup> / <sub>8</sub>	.30	2.0
†BJ 6 6" BJ 6 x 4	8 <sup>1</sup> / <sub>2</sub>	5 <sup>7</sup> / <sub>8</sub>	4	<sup>3</sup> / <sub>16</sub>	<sup>3</sup> / <sub>16</sub>	<sup>3</sup> / <sub>16</sub>	5	<sup>11</sup> / <sub>16</sub>	7	.25	2.0
BS 5 5" BS 5 x 5	18.9	5	5	<sup>5</sup> / <sub>16</sub>	<sup>1</sup> / <sub>2</sub>	<sup>5</sup> / <sub>16</sub>	3 <sup>3</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>8</sub>	.313	7.4
†BS 4 4" BS 4 x 4	13	4 <sup>1</sup> / <sub>8</sub>	4	<sup>5</sup> / <sub>16</sub>	<sup>3</sup> / <sub>8</sub>	<sup>5</sup> / <sub>16</sub>	2 <sup>7</sup> / <sub>8</sub>	<sup>3</sup> / <sub>4</sub>	5 <sup>7</sup> / <sub>8</sub>	.25	2.0

† These shapes have flange slope of 2 pct.

I  
BJ & BS

I  
STD

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ANGLES

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PILING

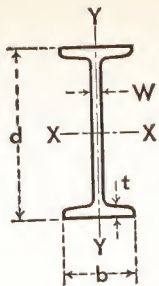
T  
TEES

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CAR & SHIP

L  
BULB

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CAR

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ZEES



# BEAMS

## American Standard

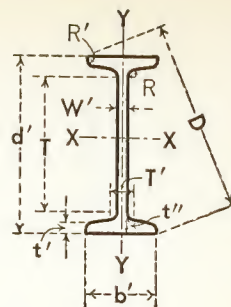
*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section A	Depth of Section d	Flange		Web Thickness W	AXIS X-X			AXIS Y-Y		
				Width	Average Thickness		I	S	r	I'	S'	r'
				b	t		in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>I 24A</b>												
24" Ia	120.0	35.13	24.00	8.048	1.102	.798	3010.8	250.9	9.26	84.9	21.1	1.56
24 x 7 $\frac{7}{8}$	105.9	30.98	24.00	7.875	1.102	.625	2811.5	234.3	9.53	78.9	20.0	1.60
<b>I 24</b>												
24" I	100.0	29.25	24.00	7.247	.871	.747	2371.8	197.6	9.05	48.4	13.4	1.29
24 x 7	90.0	26.30	24.00	7.124	.871	.624	2230.1	185.8	9.21	45.5	12.8	1.32
	79.9	23.33	24.00	7.000	.871	.500	2087.2	173.9	9.46	42.9	12.2	1.36
<b>I 20A</b>												
20" Ia	95.0	27.74	20.00	7.200	.916	.800	1599.7	160.0	7.59	50.5	14.0	1.35
20 x 7	85.0	24.80	20.00	7.053	.916	.653	1501.7	150.2	7.78	47.0	13.3	1.38
<b>I 20</b>												
20" I	75.0	21.90	20.00	6.391	.789	.641	1263.5	126.3	7.60	30.1	9.4	1.17
20 x 6 $\frac{1}{4}$	65.4	19.08	20.00	6.250	.789	.500	1169.5	116.9	7.83	27.9	8.9	1.21
<b>I 18</b>												
18" I	70.0	20.46	18.00	6.251	.691	.711	917.5	101.9	6.70	24.5	7.8	1.09
18 x 6	54.7	15.94	18.00	6.000	.691	.460	795.5	88.4	7.07	21.2	7.1	1.15
<b>I 15</b>												
15" I	50.0	14.59	15.00	5.640	.622	.550	481.1	64.2	5.74	16.0	5.7	1.05
15 x 5 $\frac{1}{2}$	42.9	12.49	15.00	5.500	.622	.410	441.8	58.9	5.95	14.6	5.3	1.08












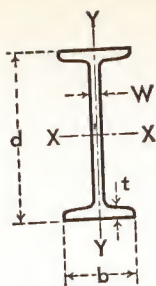
# BEAMS

## American Standard



*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange				Web Thickness (Nominal)	Tangent		Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Radius of Rounding (Toe)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root			Web (Nominal)	Distance (Nominal)				
	lb	d'	b'	t'	t''	W'	T	T'	D	R	R'	pct	
<b>I 24A</b>													
24" Ia	120	24	8	13/16	1 3/8	13/16	20 1/8	1 13/16	25 3/8	.60	.30	16 3/8	
24 x 7 3/8	105.9	24	7 3/8	13/16	1 3/8	5/8	20 1/8	1 5/8	25 1/4	.60	.30	16 3/8	
<b>I 24</b>													
24" I	100	24	7 1/4	5/8	1 1/8	3/4	20 3/4	1 3/4	25 1/8	.60	.30	16 3/8	
24 x 7	90	24	7 1/8	5/8	1 1/8	5/8	20 3/4	1 5/8	25	.60	.30	16 3/8	<b>ANGLES</b>
	79.9	24	7	5/8	1 1/8	1/2	20 3/4	1 1/2	25	.60	.30	16 3/8	
													<b>PILING</b>
<b>I 20A</b>													
20" Ia	95	20	7 1/4	5/8	1 3/16	13/16	16 1/2	2	21 1/4	.70	.36	16 3/8	
20 x 7	85	20	7	5/8	1 3/16	1 1/16	16 1/2	1 13/16	21 1/4	.70	.36	16 3/8	<b>TEES</b>
<b>I 20</b>													
20" I	75	20	6 3/8	9/16	1	5/8	16 7/8	1 5/8	21	.60	.30	16 3/8	
20 x 6 1/4	65.4	20	6 1/4	9/16	1	1/2	16 7/8	1 1/2	21	.60	.30	16 3/8	<b>CAR &amp; SHIP</b>
<b>I 18</b>													
18" I	70	18	6 1/4	7/16	1 5/16	3/4	15 1/4	1 5/8	19	.56	.28	16 3/8	
18 x 6	54.7	18	6	7/16	1 5/16	1/2	15 1/4	1 3/8	19	.56	.28	16 3/8	<b>BULB</b>
<b>I 15</b>													
15" I	50	15	5 3/8	7/16	1 3/16	9/16	12 1/2	1 3/8	16	.51	.25	16 3/8	
15 x 5 1/2	42.9	15	5 1/2	7/16	1 3/16	7/16	12 1/2	1 1/4	16	.51	.25	16 3/8	<b>CAR</b>
													
													<b>ZEEES</b>



# BEAMS

## American Standard

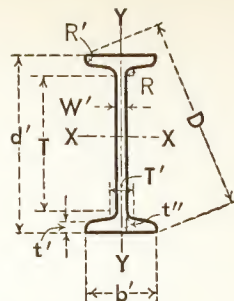
*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Average Thickness		I	S	r	I'	S'	r'
				b	t		in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
	lb	in. <sup>2</sup>	in.	in.	in.	in.						
<b>I 12A</b>												
12" Ia	50.0	14.57	12.00	5.477	.659	.687	301.6	50.3	4.55	16.0	5.8	1.05
12 x 5 1/4	40.8	11.84	12.00	5.250	.659	.460	268.9	44.8	4.77	13.8	5.3	1.08
<b>I 12</b>												
12" I	35.0	10.20	12.00	5.078	.544	.428	227.0	37.8	4.72	10.0	3.9	.99
12 x 5	31.8	9.26	12.00	5.000	.544	.350	215.8	36.0	4.83	9.5	3.8	1.01
<b>I 10</b>												
10" I	35.0	10.22	10.00	4.944	.491	.594	145.8	29.2	3.78	8.5	3.4	.91
10 x 4 5/8	25.4	7.38	10.00	4.660	.491	.310	122.1	24.4	4.07	6.9	3.0	.97
<b>I 8</b>												
8" I	23.0	6.71	8.00	4.171	.425	.441	64.2	16.0	3.09	4.4	2.1	.81
8 x 4	18.4	5.34	8.00	4.000	.425	.270	56.9	14.2	3.26	3.8	1.9	.84
<b>I 7</b>												
7" I	20.0	5.83	7.00	3.860	.392	.450	41.9	12.0	2.68	3.1	1.6	.74
7 x 3 3/8	15.3	4.43	7.00	3.660	.392	.250	36.2	10.4	2.86	2.7	1.5	.78
<b>I 6</b>												
6" I	17.25	5.02	6.00	3.565	.359	.465	26.0	8.7	2.28	2.3	1.3	.68
6 x 3 3/8	12.5	3.61	6.00	3.330	.359	.230	21.8	7.3	2.46	1.8	1.1	.72
<b>I 5</b>												
5" I	14.75	4.29	5.00	3.284	.326	.494	15.0	6.0	1.87	1.7	1.0	.63
5 x 3	10.0	2.87	5.00	3.000	.326	.210	12.1	4.8	2.05	1.2	.82	.65
<b>I 4</b>												
4" I	9.5	2.76	4.00	2.796	.293	.326	6.7	3.3	1.56	.91	.65	.58
4 x 2 5/8	7.7	2.21	4.00	2.660	.293	.190	6.0	3.0	1.64	.77	.58	.59
<b>I 3</b>												
3" I	7.5	2.17	3.00	2.509	.260	.349	2.9	1.9	1.15	.59	.47	.52
3 x 2 3/8	5.7	1.64	3.00	2.330	.260	.170	2.5	1.7	1.23	.46	.40	.53



# BEAMS

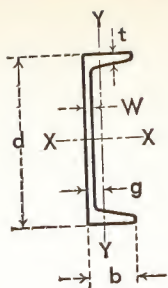
## American Standard



*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent		Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Radius of Rounding (Toe)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root		Web (Nominal)	T					
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	pct	
<b>I 12A</b>													
12" Ia	50	12	5½	7/16	7/8	1 1/16	9¾	15¾	13¼	.56	.28	16¾	
12 x 5¼	40.8	12	5¼	7/16	7/8	½	9¾	13¾	13¾	.56	.28	16¾	
<b>I 12</b>													
12" I	35	12	5½	¾	¾	7/16	9¾	13/16	13	.45	.21	16¾	
12 x 5	31.8	12	5	¾	¾	¾	9¾	1 1/8	13	.45	.21	16¾	
<b>I 10</b>													
10" I	35	10	5	5/16	1 1/16	5/8	8	1¼	11½	.41	.19	16¾	
10 x 45/8	25.4	10	45/8	5/16	1 1/16	5/16	8	1	11	.41	.19	16¾	
<b>I 8</b>													
8" I	23	8	4½	¼	9/16	7/16	6¼	1 1/16	9	.37	.16	16¾	
8 x 4	18.4	8	4	¼	9/16	5/16	6¼	7/8	9	.37	.16	16¾	
<b>I 7</b>													
7" I	20	7	3¾	¼	9/16	7/16	5¾	1 1/16	8	.35	.15	16¾	
7 x 35/8	15.3	7	3¾	¼	9/16	¼	5¾	13/16	77/8	.35	.15	16¾	
<b>I 6</b>													
6" I	17.25	6	3¾	¼	½	½	4½	1	7	.33	.14	16¾	
6 x 3¾	12.5	6	3¾	¼	½	¼	4½	13/16	67/8	.33	.14	16¾	
<b>I 5</b>													
5" I	14.75	5	3¼	3/16	7/16	½	3¾	1	6	.31	.13	16¾	
5 x 3	10	5	3	3/16	7/16	¼	3¾	¾	57/8	.31	.13	16¾	
<b>I 4</b>													
4" I	9.5	4	2¾	3/16	¾	5/16	2¾	13/16	47/8	.29	.11	16¾	
4 x 25/8	7.7	4	25/8	3/16	¾	3/16	2¾	1 1/16	4¾	.29	.11	16¾	
<b>I 3</b>													
3" I	7.5	3	2½	3/16	¾	¾	17/8	13/16	37/8	.27	.10	16¾	
3 x 2¾	5.7	3	2¾	3/16	¾	3/16	17/8	5/8	3¾	.27	.10	16¾	





# CHANNELS

## American Standard

*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y			
				Width	Average Thickness		I	S	r	I'	S'	r'	g
				b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
<b>*SC 18</b> 18" SC 18 x 4	58.0	16.98	18.00	4.200	.625	.700	670.7	74.5	6.29	18.5	5.6	1.04	.88
	51.9	15.18	18.00	4.100	.625	.600	622.1	69.1	6.40	17.1	5.3	1.06	.87
	45.8	13.38	18.00	4.000	.625	.500	573.5	63.7	6.55	15.8	5.1	1.09	.89
	42.7	12.48	18.00	3.950	.625	.450	549.2	61.0	6.64	15.0	4.9	1.10	.90
<b>C 15</b> 15" $\text{C}$ 15 x 3 $\frac{3}{8}$	50.0	14.64	15.00	3.716	.650	.716	401.4	53.6	5.24	11.2	3.8	.87	.80
	40.0	11.70	15.00	3.520	.650	.520	346.3	46.2	5.44	9.3	3.4	.89	.78
	33.9	9.90	15.00	3.400	.650	.400	312.6	41.7	5.62	8.2	3.2	.91	.79
<b>C 12</b> 12" $\text{C}$ 12 x 3	30.0	8.79	12.00	3.170	.501	.510	161.2	26.9	4.28	5.2	2.1	.77	.68
	25.0	7.32	12.00	3.047	.501	.387	143.5	23.9	4.43	4.5	1.9	.79	.68
	20.7	6.03	12.00	2.940	.501	.280	128.1	21.4	4.61	3.9	1.7	.81	.70
<b>C 10</b> 10" $\text{C}$ 10 x 2 $\frac{5}{8}$	30.0	8.80	10.00	3.033	.436	.673	103.0	20.6	3.42	4.0	1.7	.67	.65
	25.0	7.33	10.00	2.886	.436	.526	90.7	18.1	3.52	3.4	1.5	.68	.62
	20.0	5.86	10.00	2.739	.436	.379	78.5	15.7	3.66	2.8	1.3	.70	.61
	15.3	4.47	10.00	2.600	.436	.240	66.9	13.4	3.87	2.3	1.2	.72	.64
<b>C 9</b> 9" $\text{C}$ 9 x 2 $\frac{1}{2}$	20.0	5.86	9.00	2.648	.413	.448	60.6	13.5	3.22	2.4	1.2	.65	.59
	15.0	4.39	9.00	2.485	.413	.285	50.7	11.3	3.40	1.9	1.0	.67	.59
	13.4	3.89	9.00	2.430	.413	.230	47.3	10.5	3.49	1.8	.97	.67	.61

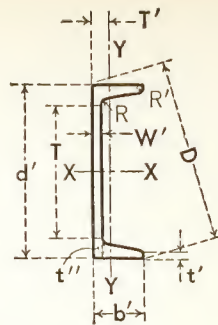
\* Car and shipbuilding channel; not an American standard.



# CHANNELS

## American Standard

*Approximate Dimensions for Detailing*



Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange				Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Radius of Rounding (Toe)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root	Web (Nominal)							
								d'					
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
*SC 18 18" SC 18 x 4	58	18	4¼	9/16	1 1/16	1 1/16	15⅝	15/16	18½	.625	.425	3.5	
	51.9	18	4⅞	9/16	1 1/16	⅝	15⅝	1⅜/16	18½	.625	.425	3.5	
	45.8	18	4	9/16	1 1/16	½	15⅝	1⅛	18½	.625	.425	3.5	
	42.7	18	4	9/16	1 1/16	7/16	15⅝	1 1/16	18⅝	.625	.425	3.5	
C 15 15" C 15 x 3⅝	50	15	3¾	⅜	7/8	¾	12⅜	1⅛	15½	.50	.24	16⅜	
	40	15	3½	⅜	7/8	9/16	12⅜	1⅝/16	15⅝	.50	.24	16⅜	
	33.9	15	3⅝	⅜	7/8	7/16	12⅜	1⅜/16	15⅝	.50	.24	16⅜	
C 12 12" C 12 x 3	30	12	3⅞	¼	¾	½	9⅞	1⅜/16	12⅝	.38	.17	16⅜	
	25	12	3	¼	¾	⅜	9⅞	1 1/16	12⅝	.38	.17	16⅜	
	20.7	12	3	¼	¾	5/16	9⅞	⅝	12⅝	.38	.17	16⅜	
C 10 10" C 10 x 2⅝	30	10	3	¼	⅝	1 1/16	8⅞	1⅝/16	10⅞	.34	.14	16⅜	
	25	10	2⅞	¼	⅝	9/16	8⅞	1⅜/16	10⅞	.34	.14	16⅜	
	20	10	2¾	¼	⅝	⅜	8⅞	1 1/16	10⅞	.34	.14	16⅜	
	15.3	10	2⅝	¼	⅝	¼	8⅞	½	10⅞	.34	.14	16⅜	
C 9 9" C 9 x 2½	20	9	2⅝	¼	⅝	7/16	7¼	¾	9⅞	.33	.14	16⅜	
	15	9	2½	¼	⅝	5/16	7¼	9/16	9⅞	.33	.14	16⅜	
	13.4	9	2⅜	¼	⅝	¼	7¼	½	9⅞	.33	.14	16⅜	

\* Car and shipbuilding channel; not an American standard.

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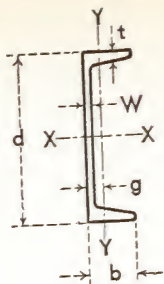
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# CHANNELS

## American Standard

*Theoretical Dimensions and Properties for Designing*

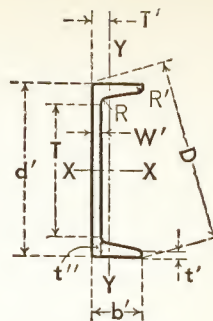
Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y			
				Width	Average Thickness		I	S	r	I'	S'	r'	g
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
lb	in. <sup>2</sup>	in.	in.	in.	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
<b>C 8</b>	18.75	5.49	8.00	2.527	.390	.487	43.7	10.9	2.82	2.0	1.0	.60	.57
8"	13.75	4.02	8.00	2.343	.390	.303	35.8	9.0	2.99	1.5	.86	.62	.56
8 x 2 1/4	11.5	3.36	8.00	2.260	.390	.220	32.3	8.1	3.10	1.3	.79	.63	.58
<b>C 7</b>	14.75	4.32	7.00	2.299	.366	.419	27.1	7.7	2.51	1.4	.79	.57	.53
7"	12.25	3.58	7.00	2.194	.366	.314	24.1	6.9	2.59	1.2	.71	.58	.53
7 x 2 1/8	9.8	2.85	7.00	2.090	.366	.210	21.1	6.0	2.72	.98	.63	.59	.55
<b>C 6</b>	13.0	3.81	6.00	2.157	.343	.437	17.3	5.8	2.13	1.1	.65	.53	.52
6"	10.5	3.07	6.00	2.034	.343	.314	15.1	5.0	2.22	.87	.57	.53	.50
6 x 2	8.2	2.39	6.00	1.920	.343	.200	13.0	4.3	2.34	.70	.50	.54	.52
<b>C 5</b>	9.0	2.63	5.00	1.885	.320	.325	8.8	3.5	1.83	.64	.45	.49	.48
5"	6.7	1.95	5.00	1.750	.320	.190	7.4	3.0	1.95	.48	.38	.50	.49
5 x 1 3/4													
<b>C 4</b>	7.25	2.12	4.00	1.720	.296	.320	4.5	2.3	1.47	.44	.35	.46	.46
4"	5.4	1.56	4.00	1.580	.296	.180	3.8	1.9	1.56	.32	.29	.45	.46
4 x 1 1/2													
<b>C 3</b>	6.0	1.75	3.00	1.596	.273	.356	2.1	1.4	1.08	.31	.27	.42	.46
3"	5.0	1.46	3.00	1.498	.273	.258	1.8	1.2	1.12	.25	.24	.41	.44
3 x 1 1/2	4.1	1.19	3.00	1.410	.273	.170	1.6	1.1	1.17	.20	.21	.41	.44



# CHANNELS

## American Standard

*Approximate Dimensions for Detailing*



Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange				Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Radius of Rounding (Toe)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root	Web (Nominal)							
						d'	b'	t'	t''	W'	T	T'	D
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
<b>C 8</b> 8" L 8 x 2¼	18.75	8	2½	¼	9/16	½	6¾	¾	8¾	.32	.13	16¾	
	13.75	8	2¾	¼	9/16	5/16	6¾	9/16	8¾	.32	.13	16¾	
	11.5	8	2¼	¼	9/16	¼	6¾	½	8¾	.32	.13	16¾	
<b>C 7</b> 7" L 7 x 2½	14.75	7	2¼	3/16	½	7/16	5¾	1 1/16	7¾	.31	.13	16¾	
	12.25	7	2¼	3/16	½	5/16	5¾	9/16	7¾	.31	.13	16¾	
	9.8	7	2½	3/16	½	¼	5¾	½	7¼	.31	.13	16¾	
<b>C 6</b> 6" L 6 x 2	13.0	6	2½	3/16	½	7/16	4½	1 1/16	6¾	.30	.12	16¾	
	10.5	6	2	3/16	½	5/16	4½	9/16	6¾	.30	.12	16¾	
	8.2	6	1¾	3/16	½	3/16	4½	7/16	6¼	.30	.12	16¾	
<b>C 5</b> 5" L 5 x 1¾	9.0	5	1¾	3/16	7/16	5/16	3¾	9/16	5¾	.29	.11	16¾	
	6.7	5	1¾	3/16	7/16	3/16	3¾	7/16	5¼	.29	.11	16¾	
<b>C 4</b> 4" L 4 x 1½	7.25	4	1¾	3/16	7/16	5/16	2¾	9/16	4¾	.28	.11	16¾	
	5.4	4	1½	3/16	7/16	3/16	2¾	7/16	4¼	.28	.11	16¾	
<b>C 3</b> 3" L 3 x 1½	6.0	3	1½	3/16	¾	¾	1¾	9/16	3¾	.27	.10	16¾	
	5.0	3	1½	3/16	¾	¼	1¾	½	3¾	.27	.10	16¾	
	4.1	3	1¾	3/16	¾	3/16	1¾	¾	3¾	.27	.10	16¾	



ANGLES



PILING



TEES



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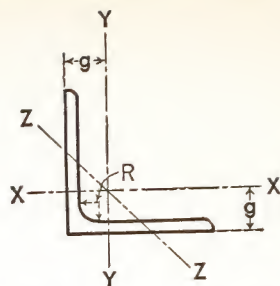
BULB



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ZEEES



# ANGLES

## Equal Legs

*Theoretical Dimensions and Properties for Designing*

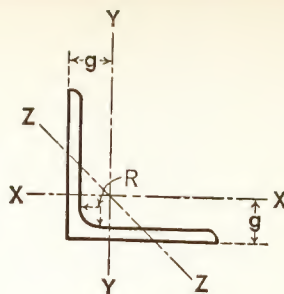
Section Number and Size	Thickness	Weight per Foot	Area of Section	Radius of Fillet	AXIS X-X AND AXIS Y-Y				AXIS Z-Z
					I	S	r or r'	g	r''
					in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in.
8 x 8 A 80	1 1/8	56.9	16.73	5/8	98.0	17.5	2.42	2.41	1.56
	1	51.0	15.00	5/8	89.0	15.8	2.44	2.37	1.56
	7/8	45.0	13.23	5/8	79.6	14.0	2.45	2.32	1.57
	3/4	38.9	11.44	5/8	69.7	12.2	2.47	2.28	1.57
	5/8	32.7	9.61	5/8	59.4	10.3	2.49	2.23	1.58
	9/16	29.6	8.68	5/8	54.1	9.3	2.50	2.21	1.58
	1/2	26.4	7.75	5/8	48.6	8.4	2.50	2.19	1.59
6 x 6 A 60	1	37.4	11.00	1/2	35.5	8.6	1.80	1.86	1.17
	7/8	33.1	9.73	1/2	31.9	7.6	1.81	1.82	1.17
	3/4	28.7	8.44	1/2	28.2	6.7	1.83	1.78	1.17
	5/8	24.2	7.11	1/2	24.2	5.7	1.84	1.73	1.18
	9/16	21.9	6.43	1/2	22.1	5.1	1.85	1.71	1.18
	1/2	19.6	5.75	1/2	19.9	4.6	1.86	1.68	1.18
	7/16	17.2	5.06	1/2	17.7	4.1	1.87	1.66	1.19
5 x 5 A 50	3/8	14.9	4.36	1/2	15.4	3.5	1.88	1.64	1.19
	7/8	27.2	7.98	1/2	17.8	5.2	1.49	1.57	.97
	3/4	23.6	6.94	1/2	15.7	4.5	1.51	1.52	.97
	5/8	20.0	5.86	1/2	13.6	3.9	1.52	1.48	.98
	1/2	16.2	4.75	1/2	11.3	3.2	1.54	1.43	.98
	7/16	14.3	4.18	1/2	10.0	2.8	1.55	1.41	.98
	3/8	12.3	3.61	1/2	8.7	2.4	1.56	1.39	.99
4 x 4 A 40	* 5/16	10.3	3.03	1/2	7.4	2.0	1.56	1.36	.99
	3/4	18.5	5.44	3/8	7.7	2.8	1.19	1.27	.78
	5/8	15.7	4.61	3/8	6.7	2.4	1.20	1.23	.78
	1/2	12.8	3.75	3/8	5.6	2.0	1.22	1.18	.78
	7/16	11.3	3.31	3/8	5.0	1.8	1.23	1.16	.78
	3/8	9.8	2.86	3/8	4.4	1.5	1.23	1.14	.79
	5/16	8.2	2.40	3/8	3.7	1.3	1.24	1.12	.79
	* 1/4	6.6	1.94	3/8	3.0	1.1	1.25	1.09	.80

\* Special gauge, taking a special extra.



# ANGLES

## Equal Legs



*Theoretical Dimensions and Properties for Designing*

Section Number and Size	Thickness	Weight per Foot	Area of Section A	Radius of Fillet R	AXIS X-X AND AXIS Y-Y				AXIS Z-Z
					I	S	r or r'	g	r''
					in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in.
<b>3½ x 3½</b> A 35	½	11.1	3.25	⅜	3.6	1.5	1.06	1.06	.68
	7/16	9.8	2.87	⅜	3.3	1.3	1.07	1.04	.68
	⅜	8.5	2.48	⅜	2.9	1.2	1.07	1.01	.69
	5/16	7.2	2.09	⅜	2.5	.98	1.08	.99	.69
	¼	5.8	1.69	⅜	2.0	.79	1.09	.97	.69
<b>3 x 3</b> A 30	½	9.4	2.75	5/16	2.2	1.1	.90	.93	.58
	7/16	8.3	2.43	5/16	2.0	.95	.91	.91	.58
	⅜	7.2	2.11	5/16	1.8	.83	.91	.89	.58
	5/16	6.1	1.78	5/16	1.5	.71	.92	.87	.59
	¼	4.9	1.44	5/16	1.2	.58	.93	.84	.59
	* 3/16	3.71	1.09	5/16	.96	.44	.94	.82	.59
<b>2½ x 2½</b> †A 25	½	7.7	2.25	¼	1.2	.72	.74	.81	.49
	⅜	5.9	1.73	¼	.98	.57	.75	.76	.49
	5/16	5.0	1.47	¼	.85	.48	.76	.74	.49
	¼	4.1	1.19	¼	.70	.39	.77	.72	.49
	3/16	3.07	.90	¼	.55	.30	.78	.69	.49
<b>2 x 2</b> †A 20	⅜	4.7	1.36	3/16	.48	.35	.59	.64	.39
	5/16	3.92	1.15	3/16	.42	.30	.60	.61	.39
	¼	3.19	.94	3/16	.35	.25	.61	.59	.39
	3/16	2.44	.71	3/16	.27	.19	.62	.57	.39
	⅛	1.65	.48	3/16	.19	.13	.63	.55	.40
<b>1¾ x 1¾</b> †A 17	¼	2.77	.81	3/16	.23	.19	.53	.53	.34
	3/16	2.12	.62	3/16	.18	.14	.54	.51	.34
	⅛	1.44	.42	3/16	.13	.10	.55	.48	.35
<b>1½ x 1½</b> †A 15	¼	2.34	.69	⅛	.14	.13	.45	.47	.29
	3/16	1.80	.53	⅛	.11	.10	.46	.44	.29
	⅛	1.23	.36	⅛	.08	.07	.47	.42	.30
<b>1¼ x 1¼</b> †A 12	¼	1.92	.56	⅛	.08	.09	.37	.40	.24
	3/16	1.48	.43	⅛	.06	.07	.38	.38	.24
	⅛	1.01	.30	⅛	.04	.05	.38	.36	.25
<b>1 x 1</b> †A 100	¼	1.49	.44	⅛	.04	.06	.29	.34	.20
	3/16	1.16	.34	⅛	.03	.04	.30	.32	.19
	⅛	.80	.23	⅛	.02	.03	.30	.30	.20

† These sections are in the bar classification, and are subject to bar extras.

\* Special gauge, taking a special extra.



ANGLES



PILING



TEES



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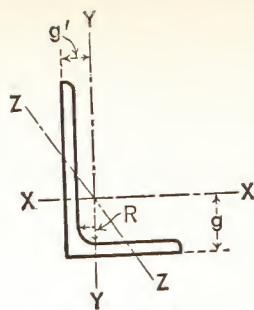
BULB



CAR



ZEEES



# ANGLES

## Unequal Legs

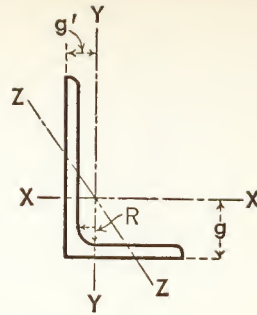
*Theoretical Dimensions and Properties for Designing*

Section Number and Size	Thick-ness	Weight per Foot	Area of Section A	Radius of Fillet R	AXIS X-X				AXIS Y-Y				AXIS Z-Z
					I	S	r	g	I'	S'	r'	g'	r''
					in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in.
9 x 4 A 94	1	40.8	12.00	1/2	97.0	17.6	2.84	3.50	12.0	4.0	1.00	1.00	.83
	7/8	36.1	10.61	1/2	86.8	15.7	2.86	3.45	10.8	3.6	1.01	.95	.84
	3/4	31.3	9.19	1/2	76.1	13.6	2.88	3.41	9.6	3.1	1.02	.91	.84
	5/8	26.3	7.73	1/2	64.9	11.5	2.90	3.36	8.3	2.6	1.04	.86	.85
	9/16	23.8	7.00	1/2	59.1	10.4	2.91	3.33	7.6	2.4	1.04	.83	.85
	1/2	21.3	6.25	1/2	53.2	9.3	2.92	3.31	6.9	2.2	1.05	.81	.85
8 x 6 A 86	1	44.2	13.00	1/2	80.8	15.1	2.49	2.65	38.8	8.9	1.73	1.65	1.28
	7/8	39.1	11.48	1/2	72.3	13.4	2.51	2.61	34.9	7.9	1.74	1.61	1.28
	3/4	33.8	9.94	1/2	63.4	11.7	2.53	2.56	30.7	6.9	1.76	1.56	1.29
	5/8	28.5	8.36	1/2	54.1	9.9	2.54	2.52	26.3	5.9	1.77	1.52	1.29
	9/16	25.7	7.56	1/2	49.3	9.0	2.55	2.50	24.0	5.3	1.78	1.50	1.30
	1/2	23.0	6.75	1/2	44.3	8.0	2.56	2.47	21.7	4.8	1.79	1.47	1.30
8 x 4 A 84	7/16	20.2	5.93	1/2	39.2	7.1	2.57	2.45	19.3	4.2	1.80	1.45	1.31
	1	37.4	11.00	1/2	69.6	14.1	2.52	3.05	11.6	3.9	1.03	1.05	.85
	7/8	33.1	9.73	1/2	62.5	12.5	2.53	3.00	10.5	3.5	1.04	1.00	.85
	3/4	28.7	8.44	1/2	54.9	10.9	2.55	2.95	9.4	3.1	1.05	.95	.85
	5/8	24.2	7.11	1/2	46.9	9.2	2.57	2.91	8.1	2.6	1.07	.91	.86
	9/16	21.9	6.43	1/2	42.8	8.4	2.58	2.88	7.4	2.4	1.07	.88	.86
7 x 4 A 74	1/2	19.6	5.75	1/2	38.5	7.5	2.59	2.86	6.7	2.2	1.08	.86	.86
	7/16	17.2	5.06	1/2	34.1	6.6	2.60	2.83	6.0	1.9	1.09	.83	.87
	7/8	30.2	8.86	1/2	42.9	9.7	2.20	2.55	10.2	3.5	1.07	1.05	.86
	3/4	26.2	7.69	1/2	37.8	8.4	2.22	2.51	9.1	3.0	1.09	1.01	.86
	5/8	22.1	6.48	1/2	32.4	7.1	2.24	2.46	7.8	2.6	1.10	.96	.86
	9/16	20.0	5.87	1/2	29.6	6.5	2.24	2.44	7.2	2.4	1.11	.94	.87
	1/2	17.9	5.25	1/2	26.7	5.8	2.25	2.42	6.5	2.1	1.11	.92	.87
	7/16	15.8	4.62	1/2	23.7	5.1	2.26	2.39	5.8	1.9	1.12	.89	.88
	3/8	13.6	3.98	1/2	20.6	4.4	2.27	2.37	5.1	1.6	1.13	.87	.88



# ANGLES

## Unequal Legs



*Theoretical Dimensions and Properties for Designing*

Section Number and Size	Thick-ness	Weight per Foot	Area of Section A	Radius of Fillet R	AXIS X-X				AXIS Y-Y				AXIS Z-Z r''
					I	S	r	g	I'	S'	r'	g'	
					in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	
<b>6 x 4</b> A 64	7/8	27.2	7.98	1/2	27.7	7.2	1.86	2.12	9.8	3.4	1.11	1.12	.86
	3/4	23.6	6.94	1/2	24.5	6.3	1.88	2.08	8.7	3.0	1.12	1.08	.86
	5/8	20.0	5.86	1/2	21.1	5.3	1.90	2.03	7.5	2.5	1.13	1.03	.86
	9/16	18.1	5.31	1/2	19.3	4.8	1.90	2.01	6.9	2.3	1.14	1.01	.87
	1/2	16.2	4.75	1/2	17.4	4.3	1.91	1.99	6.3	2.1	1.15	.99	.87
	7/16	14.3	4.18	1/2	15.5	3.8	1.92	1.96	5.6	1.9	1.16	.96	.87
	3/8	12.3	3.61	1/2	13.5	3.3	1.93	1.94	4.9	1.6	1.17	.94	.88
	* 5/16	10.3	3.03	1/2	11.4	2.8	1.94	1.92	4.2	1.4	1.17	.92	.88
<b>6 x 3 1/2</b> A 63	1/2	15.3	4.50	1/2	16.6	4.2	1.92	2.08	4.2	1.6	.97	.83	.76
	3/8	11.7	3.42	1/2	12.9	3.2	1.94	2.04	3.3	1.2	.99	.79	.77
	* 5/16	9.8	2.87	1/2	10.9	2.7	1.95	2.01	2.8	1.0	1.00	.76	.77
<b>5 x 3 1/2</b> A 54	3/4	19.8	5.81	7/16	13.9	4.3	1.55	1.75	5.6	2.2	.98	1.00	.75
	5/8	16.8	4.92	7/16	12.0	3.7	1.56	1.70	4.8	1.9	.99	.95	.75
	1/2	13.6	4.00	7/16	10.0	3.0	1.58	1.66	4.1	1.6	1.01	.91	.75
	7/16	12.0	3.53	7/16	8.9	2.6	1.59	1.63	3.6	1.4	1.01	.88	.76
	3/8	10.4	3.05	7/16	7.8	2.3	1.60	1.61	3.2	1.2	1.02	.86	.76
	5/16	8.7	2.56	7/16	6.6	1.9	1.61	1.59	2.7	1.0	1.03	.84	.77
	* 1/4	7.0	2.06	7/16	5.4	1.6	1.61	1.56	2.2	.83	1.04	.81	.77
<b>5 x 3</b> A 53	1/2	12.8	3.75	3/8	9.4	2.9	1.59	1.75	2.6	1.1	.83	.75	.65
	3/8	9.8	2.86	3/8	7.4	2.2	1.61	1.70	2.0	.89	.84	.70	.65
	5/16	8.2	2.40	3/8	6.3	1.9	1.61	1.68	1.7	.75	.85	.68	.66
	* 1/4	6.6	1.94	3/8	5.1	1.5	1.62	1.66	1.4	.61	.86	.66	.66

\* Special gauge, taking a special extra.



PILING



TEES



CAR & SHIP



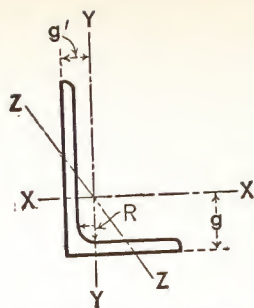
BULB



CAR



ZEES



# ANGLES

## Unequal Legs

*Theoretical Dimensions and Properties for Designing*

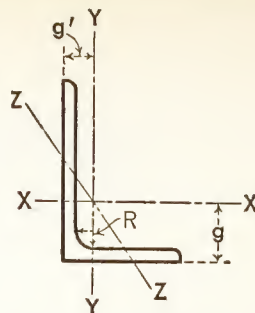
Section Number and Size	Thick-ness	Weight per Foot	Area of Section A	Radius of Fillet R	AXIS X-X				AXIS Y-Y				AXIS Z-Z
					I	S	r	g	I'	S'	r'	g'	r''
					in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in.
<b>4 x 3½</b> A 44	⅝	14.7	4.30	⅜	6.4	2.4	1.22	1.29	4.5	1.8	1.03	1.04	.72
	½	11.9	3.50	⅜	5.3	1.9	1.23	1.25	3.8	1.5	1.04	1.00	.72
	⅞	10.6	3.09	⅜	4.8	1.7	1.24	1.23	3.4	1.4	1.05	.98	.72
	⅜	9.1	2.67	⅜	4.2	1.5	1.25	1.21	3.0	1.2	1.06	.96	.73
	⅝	7.7	2.25	⅜	3.6	1.3	1.26	1.18	2.6	1.0	1.07	.93	.73
	* ¼	6.2	1.81	⅜	2.9	1.0	1.27	1.16	2.1	.81	1.07	.91	.73
<b>4 x 3</b> A 43	⅝	13.6	3.98	⅜	6.0	2.3	1.23	1.37	2.9	1.4	.85	.87	.64
	½	11.1	3.25	⅜	5.1	1.9	1.25	1.33	2.4	1.1	.86	.83	.64
	⅞	9.8	2.87	⅜	4.5	1.7	1.25	1.30	2.2	1.0	.87	.80	.64
	⅜	8.5	2.48	⅜	4.0	1.5	1.26	1.28	1.9	.87	.88	.78	.64
	⅝	7.2	2.09	⅜	3.4	1.2	1.27	1.26	1.7	.73	.89	.76	.65
	* ¼	5.8	1.69	⅜	2.8	1.0	1.28	1.24	1.4	.60	.90	.74	.65
<b>3½ x 3</b> A 38	½	10.2	3.00	⅜	3.5	1.5	1.07	1.13	2.3	1.1	.88	.88	.62
	⅞	9.1	2.65	⅜	3.1	1.3	1.08	1.10	2.1	.98	.89	.85	.62
	⅜	7.9	2.30	⅜	2.7	1.1	1.09	1.08	1.9	.85	.90	.83	.62
	⅝	6.6	1.93	⅜	2.3	.95	1.10	1.06	1.6	.72	.90	.81	.63
	¼	5.4	1.56	⅜	1.9	.78	1.11	1.04	1.3	.59	.91	.79	.63
<b>3½ x 2½</b> A 37	½	9.4	2.75	⅝	3.2	1.4	1.09	1.20	1.4	.76	.70	.70	.53
	⅞	8.3	2.43	⅝	2.9	1.3	1.09	1.18	1.2	.68	.71	.68	.54
	⅜	7.2	2.11	⅝	2.6	1.1	1.10	1.16	1.1	.59	.72	.66	.54
	⅝	6.1	1.78	⅝	2.2	.93	1.11	1.14	.94	.50	.73	.64	.54
	¼	4.9	1.44	⅝	1.8	.75	1.12	1.11	.78	.41	.74	.61	.54

\* Special gauge, taking a special extra.



# ANGLES

## Unequal Legs



*Theoretical Dimensions and Properties for Designing*

Section Number and Size	Thick-ness	Weight per Foot	Area of Section A	Radius of Fillet R	AXIS X-X				AXIS Y-Y				AXIS Z-Z r''
					I	S	r	g	I'	S'	r'	g'	
					in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	
<b>3 x 2½</b> A 33	½	8.5	2.50	⅝	2.1	1.0	.91	1.00	1.3	.74	.72	.75	.52
	⅞	7.6	2.21	⅝	1.9	.93	.92	.98	1.2	.66	.73	.73	.52
	¾	6.6	1.92	⅝	1.7	.81	.93	.96	1.0	.58	.74	.71	.52
	⅝	5.6	1.62	⅝	1.4	.69	.94	.93	.90	.49	.74	.68	.53
	¼	4.5	1.31	⅝	1.2	.56	.95	.91	.74	.40	.75	.66	.53
<b>3 x 2</b> A 32	½	7.7	2.25	⅝	1.9	1.0	.92	1.08	.67	.47	.55	.58	.43
	⅞	6.8	2.00	⅝	1.7	.89	.93	1.06	.61	.42	.55	.56	.43
	¾	5.9	1.73	⅝	1.5	.78	.94	1.04	.54	.37	.56	.54	.43
	⅝	5.0	1.47	⅝	1.3	.66	.95	1.02	.47	.32	.57	.52	.43
	¼	4.1	1.19	⅝	1.1	.54	.96	.99	.39	.26	.57	.49	.43
	* ⅜	3.07	.90	⅝	.84	.41	.97	.97	.31	.20	.58	.47	.44
<b>2½ x 2</b> †A 27	¾	5.3	1.55	¼	.91	.55	.77	.83	.51	.36	.58	.58	.42
	⅝	4.5	1.31	¼	.79	.47	.78	.81	.45	.31	.58	.56	.42
	¼	3.62	1.06	¼	.65	.38	.78	.79	.37	.25	.59	.54	.42
	⅜	2.75	.81	¼	.51	.29	.79	.76	.29	.20	.60	.51	.43
<b>2½ x 1½</b> †A 26	⅝	3.92	1.15	⅜	.71	.44	.79	.90	.19	.17	.41	.40	.32
	¼	3.19	.94	⅜	.59	.36	.79	.88	.16	.14	.41	.38	.32
	⅜	2.44	.72	⅜	.46	.28	.80	.85	.13	.11	.42	.35	.33
<b>2 x 1½</b> †A 21	¼	2.77	.81	⅜	.32	.24	.62	.66	.15	.14	.43	.41	.32
	⅜	2.12	.62	⅜	.25	.18	.63	.64	.12	.11	.44	.39	.32
	⅝	1.44	.42	⅜	.17	.13	.64	.62	.09	.08	.45	.37	.33
<b>2 x 1¼</b> †A 23	¼	2.55	.75	⅜	.30	.23	.63	.71	.09	.10	.34	.33	.27
	⅜	1.96	.57	⅜	.23	.18	.64	.69	.07	.08	.35	.31	.27
<b>1¾ x 1¼</b> †A 16	¼	2.34	.69	⅜	.20	.18	.54	.60	.09	.10	.35	.35	.27
	⅜	1.80	.53	⅜	.16	.14	.55	.58	.07	.08	.36	.33	.27
	⅝	1.23	.36	⅜	.11	.09	.56	.56	.05	.05	.37	.31	.27

\* Special gauge, taking a special extra.

† These sections are in the bar classification, and are subject to bar extras.



PILING



TEES



CAR & SHIP



BULB

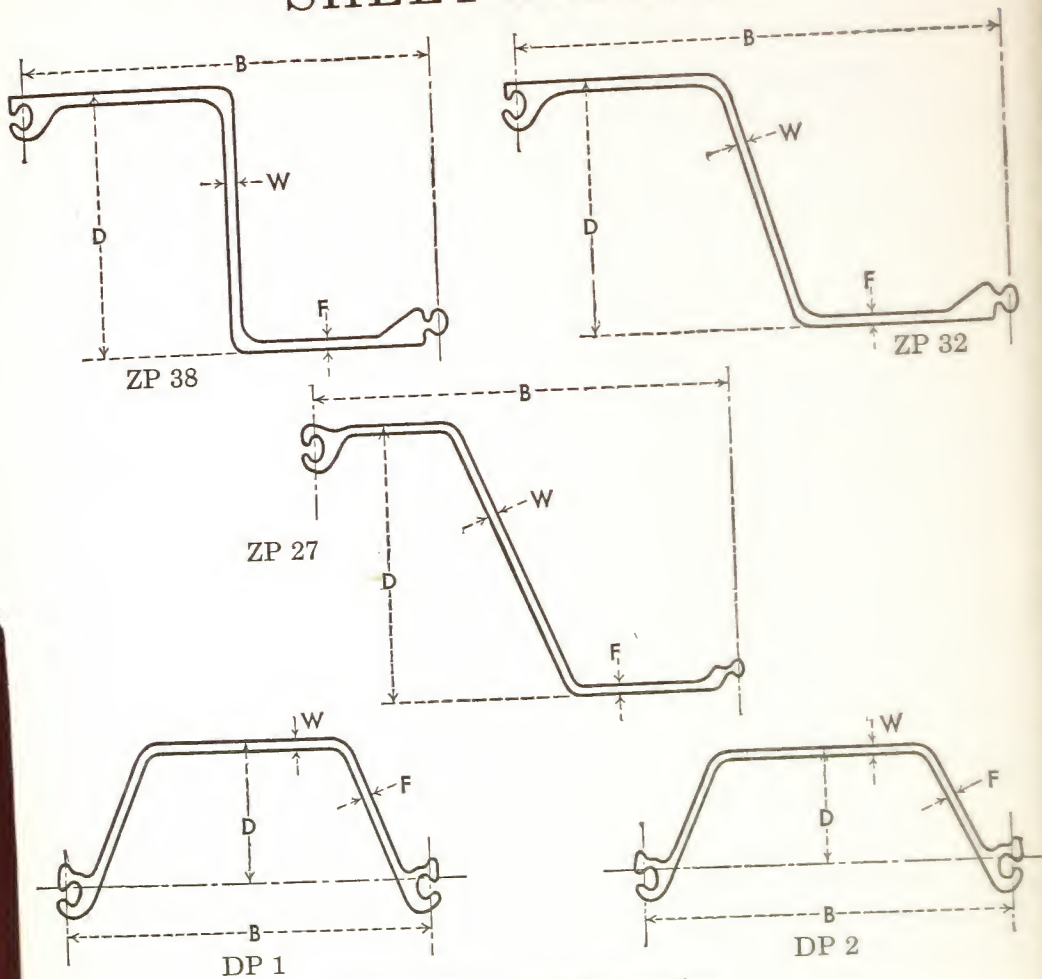


CAR



ZEEES

# BETHLEHEM STEEL SHEET PILING

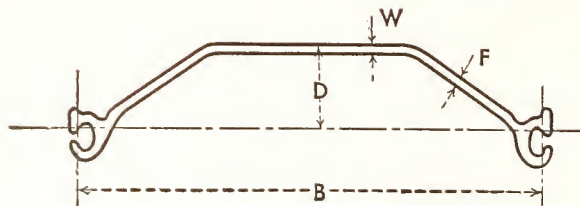


*Dimensions and Properties*

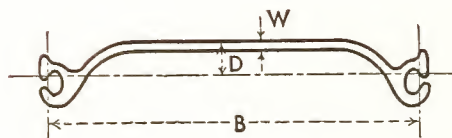
Section Number	Nominal Width	Web Thickness	Flange Thickness	Nominal Depth	Single Section				Per Foot of Wall	
	B	W	F	D	Weight per Foot	Area	I	S	Weight lb per sq ft	S
	in.	in.	in.	in.	lb	in. <sup>2</sup>	in. <sup>4</sup>	in. <sup>3</sup>		in. <sup>3</sup>
<b>ZP 38</b>	18	$\frac{3}{8}$	$\frac{1}{2}$	12	57.0	16.77	421.2	70.2	38.0	46.8
<b>ZP 32</b>	21	$\frac{3}{8}$	$\frac{1}{2}$	11 $\frac{1}{2}$	56.0	16.47	385.7	67.0	32.0	38.3
<b>ZP 27</b>	18	$\frac{3}{8}$	$\frac{3}{8}$	12	40.5	11.91	276.3	45.3	27.0	30.2
<b>DP 1</b>	16	$\frac{3}{16}$	$\frac{3}{8}$	6	42.7	12.56	87.0	20.4	32.0	15.3
<b>DP 2</b>	16	$\frac{3}{8}$	$\frac{3}{8}$	5	36.0	10.59	53.0	14.3	27.0	10.7



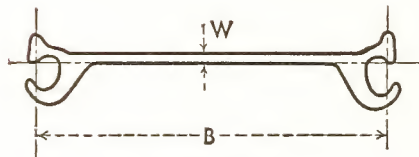
# BETHLEHEM STEEL SHEET PILING



AP 3



SP 4, SP 5



SP 6a, SP 7a

## Dimensions and Properties

Section Number	Nominal Width	Web Thickness	Flange Thickness	Nominal Depth	Single Section				Per Foot of Wall	
	B	W	F	D	Weight per Foot	Area	I	S	Weight lb per sq ft	S
	in.	in.	in.	in.	lb	in. <sup>2</sup>	in. <sup>4</sup>	in. <sup>3</sup>		in. <sup>3</sup>
AP 3	19 $\frac{5}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	3 $\frac{1}{2}$	36.0	10.59	26.0	8.8	22.0	5.4
SP 4	16	$\frac{3}{8}$	..	1 $\frac{1}{32}$	30.7	8.99	5.5	3.2	23.0	2.4
SP 5	16	$\frac{1}{2}$	..	1 $\frac{1}{32}$	37.3	10.98	6.0	3.3	28.0	2.5
SP 6a	15	$\frac{3}{8}$	..	..	35.0	10.29	4.6	3.0	28.0	2.4
SP 7a	15	$\frac{1}{2}$	..	..	40.0	11.76	4.6	3.0	32.0	2.4

PILING

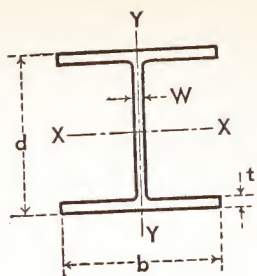
TEES

CAR & SHIP

BULB

CAR

ZEES



# BETHLEHEM BEARING PILES

*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Section	Flange		Web Thickness	AXIS X-X			AXIS Y-Y		
				Width	Thick-ness		I	S	r	I'	S'	r'
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>BP 14</b> 14 x 14½	117	34.44	14.234	14.885	.805	.805	1228.5	172.6	5.97	443.1	59.5	3.59
	102	30.01	14.032	14.784	.704	.704	1055.1	150.4	5.93	379.6	51.3	3.56
	89	26.19	13.856	14.696	.616	.616	909.1	131.2	5.89	326.2	44.4	3.53
	73	21.46	13.636	14.586	.506	.506	733.1	107.5	5.85	261.9	35.9	3.49
<b>BP 12</b> 12 x 12	74	21.76	12.122	12.217	.607	.607	566.5	93.5	5.10	184.7	30.2	2.91
	53	15.58	11.780	12.046	.436	.436	394.8	67.0	5.03	127.3	21.2	2.86
<b>BP 10</b> 10 x 10	57	16.76	10.012	10.224	.564	.564	294.7	58.9	4.19	100.6	19.7	2.45
	42	12.35	9.720	10.078	.418	.418	210.8	43.4	4.13	71.4	14.2	2.40
<b>BP 8</b> 8 x 8	36	10.60	8.026	8.158	.446	.446	119.8	29.9	3.36	40.4	9.9	1.95



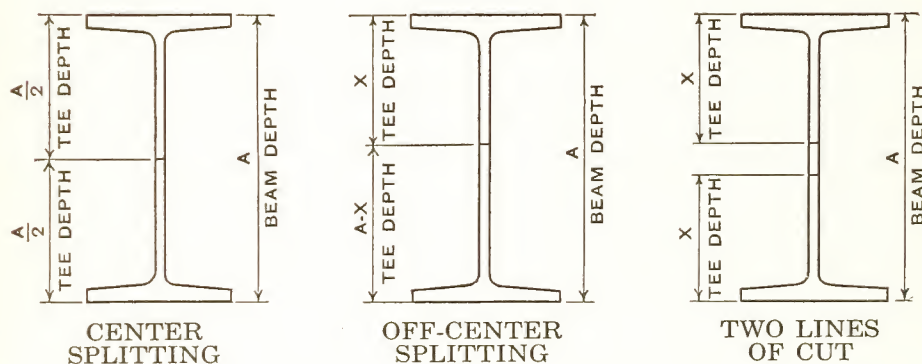
# STRUCTURAL TEES

## *Split from Wide-Flange Sections and Standard Beams*

Split tees are produced by shearing or flame-cutting either standard beams or wide-flange sections.

Generally, any beam or channel section from 3 in. to 36 in. in depth can be split to form tees or angles.

Orders should cover the full product of the beam or channel section prior to splitting.



The following tolerances, over or under, apply to the depth of the tee or angle:

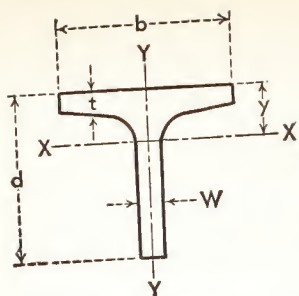
Beams or Channels up to 6 in., excl. . . . .	$\frac{1}{8}$ in.
Beams or Channels 6 in. to 16 in., excl. . . . .	$\frac{3}{16}$ in.
Beams or Channels 16 in. to 20 in., excl. . . . .	$\frac{1}{4}$ in.
Beams 20 in. to 24 in., excl. . . . .	$\frac{5}{16}$ in.
Beams 24 in. and over . . . . .	$\frac{3}{8}$ in.

The above tolerances for depth of tees or angles include the allowable tolerances in depth for the beams or channels before splitting. Tolerances both for dimensions and straightness, as set up for the beams or channels from which these tees or angles are cut, will apply, except:

$$\text{Straightness} = \frac{1}{8} \text{ in.} \times \frac{\text{length, in ft}}{5 \text{ ft}}$$

Length: The length tolerances for split tees or angles are the same as those applicable to the section from which the tees or angles are split.





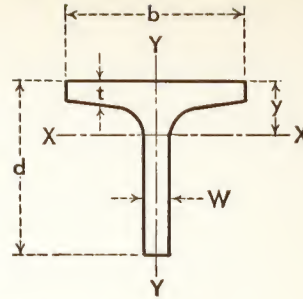
# BETHLEHEM STRUCTURAL TEES

*Theoretical Dimensions and Properties for Designing*

Section Number	Weight per Foot	Area of Section	Depth of Tee	Flange		Stem Thickness	AXIS X-X				AXIS Y-Y		
				Width	Average Thickness		I	S	r	y	I'	S'	r'
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>BT 18A</b> ST 18 WF	150	44.09	18.36	16.655	1.680	.945	1222.7	85.9	5.27	4.13	612.6	73.6	3.73
	140	41.16	18.25	16.595	1.570	.885	1133.3	79.9	5.25	4.07	563.7	67.9	3.70
	130	38.28	18.12	16.555	1.440	.845	1059.2	75.4	5.26	4.07	510.3	61.6	3.65
	122.5	36.01	18.03	16.512	1.350	.802	994.3	71.1	5.25	4.04	472.3	57.2	3.62
	115	33.86	17.94	16.475	1.260	.765	935.8	67.2	5.26	4.02	435.5	52.9	3.59
<b>BT 18</b> ST 18 WF	97	28.56	18.24	12.117	1.260	.770	904.0	67.3	5.63	4.81	177.7	29.3	2.49
	91	26.77	18.16	12.072	1.180	.725	844.0	63.0	5.61	4.77	163.9	27.1	2.47
	85	24.99	18.08	12.027	1.100	.680	784.7	58.8	5.60	4.74	150.3	25.0	2.45
	80	23.54	18.00	12.000	1.020	.653	741.0	56.0	5.61	4.76	137.7	22.9	2.42
	75	22.08	17.92	11.972	.940	.625	696.7	53.0	5.62	4.79	125.2	20.9	2.38
<b>BT 16A</b> ST 16 WF	120	35.26	16.75	15.865	1.400	.830	822.5	63.2	4.83	3.73	437.2	55.1	3.52
	110	32.36	16.63	15.810	1.275	.775	754.1	58.4	4.83	3.71	391.2	49.5	3.48
	100	29.40	16.50	15.750	1.150	.715	683.6	53.3	4.82	3.67	345.8	43.9	3.43
<b>BT 16</b> ST 16 WF	76	22.35	16.75	11.565	1.055	.635	591.9	47.4	5.15	4.26	128.1	22.1	2.39
	70.5	20.76	16.66	11.535	.960	.605	551.8	44.7	5.16	4.30	114.9	19.9	2.35
	65	19.13	16.55	11.510	.855	.580	513.0	42.1	5.18	4.37	100.7	17.5	2.29
<b>BT 15A</b> ST 15 WF	105	30.89	15.19	15.105	1.315	.775	578.0	48.7	4.33	3.31	354.0	46.9	3.38
	95	27.95	15.06	15.040	1.185	.710	520.4	44.1	4.31	3.26	312.3	41.5	3.34
	86	25.32	14.94	14.985	1.065	.655	471.0	40.2	4.31	3.23	275.1	36.7	3.30
<b>BT 15</b> ST 15 WF	66	19.41	15.15	10.551	1.000	.615	420.7	37.4	4.66	3.90	92.5	17.5	2.18
	62	18.22	15.08	10.521	.930	.585	394.8	35.3	4.65	3.90	84.8	16.1	2.16
	58	17.07	15.00	10.500	.850	.564	371.8	33.6	4.67	3.94	76.6	14.6	2.12
	54	15.88	14.91	10.484	.760	.548	349.5	32.1	4.69	4.03	67.6	12.9	2.06
<b>BT 13A</b> ST 13 WF	88.5	26.05	13.655	14.090	1.190	.725	391.8	36.7	3.88	2.97	259.4	36.8	3.16
	80	23.52	13.54	14.023	1.075	.658	351.4	33.1	3.87	2.91	229.0	32.7	3.12
	72.5	21.34	13.44	13.965	.975	.600	316.3	29.9	3.85	2.85	203.5	29.1	3.09
<b>BT 13</b> ST 13 WF	57	16.77	13.64	10.070	.932	.570	288.9	28.3	4.15	3.42	74.8	14.9	2.11
	51	15.01	13.535	10.018	.827	.518	257.7	25.4	4.14	3.39	64.8	12.9	2.08
	47	13.83	13.455	9.990	.747	.490	238.5	23.7	4.15	3.41	57.5	11.2	2.04



# BETHLEHEM STRUCTURAL TEES



*Theoretical Dimensions and Properties for Designing*

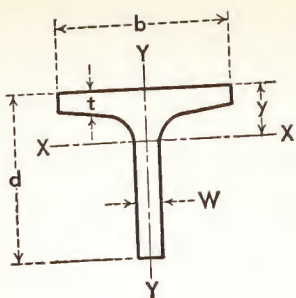
Section Number	Weight per Foot	Area of Section	Depth of Tee	Flange		Stem Thickness	AXIS X-X				AXIS Y-Y		
				Width	Average Thickness		I	S	r	y	I'	S'	r'
				b	t		in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
	lb	in. <sup>2</sup>	in.	in.	in.	in.							
<b>BT 12B</b>	80	23.54	12.36	14.091	1.135	.656	271.6	27.6	3.40	2.51	246.3	35.0	3.23
<b>ST 12 WF</b>	72.5	21.31	12.245	14.043	1.020	.608	246.2	25.2	3.40	2.48	217.1	30.9	3.19
	65	19.13	12.13	14.000	.900	.565	222.6	23.1	3.41	2.47	187.6	26.8	3.13
<b>BT 12A</b>	60	17.64	12.155	12.088	.930	.556	213.6	22.4	3.48	2.62	127.0	21.0	2.68
<b>ST 12 WF</b>	55	16.18	12.08	12.042	.855	.510	195.2	20.5	3.47	2.57	114.5	19.0	2.66
	50	14.71	12.00	12.000	.775	.468	176.7	18.7	3.46	2.54	101.8	17.0	2.63
<b>BT 12</b>	47	13.81	12.145	9.061	.872	.516	185.9	20.3	3.67	2.99	51.1	11.3	1.92
<b>ST 12 WF</b>	42	12.35	12.045	9.015	.772	.470	165.9	18.3	3.66	2.97	44.2	9.80	1.89
	38	11.18	11.955	8.985	.682	.440	151.1	16.9	3.68	3.00	38.3	8.51	1.85
<b>BT 10B</b>	71	20.89	10.73	13.132	1.095	.659	177.3	20.8	2.91	2.18	193.0	29.4	3.04
<b>ST 10 WF</b>	63.5	18.67	10.62	13.061	.985	.588	155.8	18.3	2.89	2.11	169.3	25.9	3.01
	56	16.48	10.50	13.000	.865	.527	136.4	16.2	2.88	2.06	144.8	22.3	2.96
<b>BT 10A</b>	48	14.11	10.57	9.038	.935	.575	137.1	17.1	3.11	2.55	54.7	12.1	1.97
<b>ST 10 WF</b>	41	12.05	10.43	8.962	.795	.499	115.4	14.5	3.09	2.48	44.8	10.0	1.93
<b>BT 10</b>	36.5	10.73	10.62	8.295	.740	.455	110.2	13.7	3.21	2.60	33.1	7.98	1.76
<b>ST 10 WF</b>	34	10.01	10.57	8.270	.685	.430	102.8	12.9	3.20	2.59	30.2	7.30	1.74
	31	9.12	10.495	8.240	.615	.400	93.7	11.9	3.21	2.59	26.6	6.45	1.71
<b>BT 9B</b>	57	16.77	9.24	11.833	.991	.595	102.6	13.9	2.47	1.85	127.8	21.6	2.76
<b>ST 9 WF</b>	52.5	15.45	9.16	11.792	.911	.554	93.9	12.8	2.47	1.82	115.5	19.6	2.73
	48	14.13	9.08	11.750	.831	.512	85.3	11.7	2.46	1.78	103.4	17.6	2.71
<b>BT 9A</b>	42.5	12.49	9.16	8.838	.911	.526	84.4	11.9	2.60	2.05	49.7	11.3	2.00
<b>ST 9 WF</b>	38.5	11.32	9.08	8.787	.831	.475	75.3	10.6	2.58	1.99	44.3	10.1	1.98
	35	10.28	9.00	8.750	.751	.438	68.1	9.67	2.57	1.96	39.2	8.97	1.95
	32	9.40	8.935	8.715	.686	.403	61.8	8.82	2.56	1.93	35.2	8.07	1.93
<b>BT 9</b>	30	8.82	9.125	7.558	.695	.416	64.8	9.32	2.71	2.17	23.5	6.23	1.63
<b>ST 9 WF</b>	27.5	8.09	9.06	7.532	.630	.390	59.6	8.63	2.71	2.16	21.0	5.57	1.61
	25	7.35	9.00	7.500	.570	.358	53.9	7.85	2.71	2.14	18.6	4.96	1.59
<b>BT 8B</b>	48	14.13	8.16	11.533	.875	.535	64.7	9.82	2.14	1.57	103.6	18.0	2.71
<b>ST 8 WF</b>	44	12.95	8.08	11.502	.795	.504	59.5	9.11	2.14	1.55	92.6	16.1	2.67

**CAR & SHIP**

**BULB**

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**ZEES**



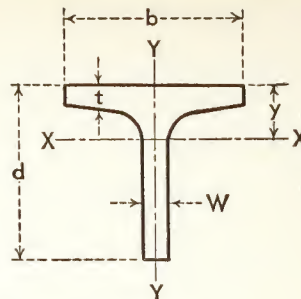
# BETHLEHEM STRUCTURAL TEES

*Theoretical Dimensions and Properties for Designing*

Section Number	Weight per Foot	Area of Section	Depth of Tee	Flange		Stem Thickness	AXIS X-X				AXIS Y-Y		
				Width	Average Thickness		I	S	r	y	I'	S'	r'
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
BT 8A ST 8 WF	39	11.46	8.16	8.586	.875	.529	60.0	9.45	2.28	1.81	43.8	10.2	1.95
	35.5	10.43	8.08	8.543	.795	.486	54.0	8.57	2.28	1.77	38.9	9.11	1.93
	32	9.40	8.00	8.500	.715	.443	48.3	7.71	2.27	1.73	34.2	8.05	1.91
	29	8.52	7.93	8.464	.645	.407	43.6	7.00	2.26	1.70	30.2	7.14	1.88
BT 8 ST 8 WF	25	7.35	8.125	7.073	.628	.380	42.2	6.77	2.40	1.89	17.4	4.92	1.54
	22.5	6.62	8.06	7.039	.563	.346	37.8	6.10	2.39	1.87	15.2	4.33	1.52
	20	5.88	8.00	7.000	.503	.307	33.2	5.37	2.37	1.82	13.3	3.79	1.50
	18	5.30	7.93	6.992	.428	.299	30.7	5.10	2.41	1.90	11.1	3.17	1.45
BT 7E ST 7 WF	105.5	31.04	7.875	15.800	1.563	.980	102.2	16.2	1.81	1.57	514.3	65.1	4.07
	101	29.70	7.815	15.750	1.503	.930	95.7	15.2	1.80	1.53	489.8	62.2	4.06
	96.5	28.36	7.75	15.710	1.438	.890	90.1	14.4	1.78	1.49	465.1	59.2	4.05
	92	27.04	7.69	15.660	1.378	.840	83.9	13.4	1.76	1.45	441.4	56.4	4.04
	88	25.87	7.625	15.640	1.313	.820	80.2	12.9	1.76	1.42	418.9	53.6	4.02
	83.5	24.55	7.56	15.600	1.248	.780	75.0	12.1	1.75	1.39	395.1	50.7	4.01
	79	23.24	7.50	15.550	1.188	.730	69.3	11.3	1.73	1.34	372.5	47.9	4.00
	75	22.04	7.44	15.515	1.128	.695	64.9	10.6	1.72	1.31	351.3	45.3	3.99
BT 7D ST 7 WF	71	20.92	7.375	15.500	1.063	.680	62.1	10.2	1.72	1.29	330.1	42.6	3.97
	68	19.99	7.375	14.740	1.063	.660	60.0	9.89	1.73	1.31	283.9	38.5	3.77
	63.5	18.67	7.31	14.690	.998	.610	54.7	9.04	1.71	1.26	263.8	35.9	3.76
	59.5	17.49	7.25	14.650	.938	.570	50.4	8.36	1.70	1.22	245.9	33.6	3.75
	55.5	16.33	7.185	14.620	.873	.540	46.7	7.80	1.69	1.19	227.4	31.1	3.73
	51.5	15.13	7.125	14.575	.813	.495	42.4	7.10	1.67	1.15	209.9	28.8	3.72
	47.5	13.97	7.06	14.545	.748	.465	39.1	6.58	1.67	1.12	191.9	26.4	3.71
	43.5	12.78	7.00	14.500	.688	.420	34.9	5.88	1.65	1.08	174.8	24.1	3.70
BT 7C ST 7 WF	42	12.36	7.09	12.023	.778	.451	37.4	6.36	1.74	1.21	112.7	18.8	3.02
	39	11.47	7.03	12.000	.718	.428	34.8	5.96	1.74	1.19	103.5	17.2	3.00
BT 7B ST 7 WF	37	10.88	7.095	10.072	.783	.450	36.1	6.26	1.82	1.32	66.7	13.3	2.48
	34	10.00	7.03	10.040	.718	.418	33.0	5.74	1.81	1.29	60.6	12.1	2.46
	30.5	8.97	6.955	10.000	.643	.378	29.2	5.13	1.80	1.25	53.6	10.7	2.45
BT 7A ST 7 WF	26.5	7.79	6.97	8.062	.658	.370	27.7	4.95	1.88	1.38	28.8	7.14	1.92
	24	7.06	6.905	8.031	.593	.339	24.9	4.49	1.88	1.35	25.6	6.38	1.91
	21.5	6.32	6.84	8.000	.528	.308	22.2	4.02	1.87	1.33	22.6	5.64	1.89



# BETHLEHEM STRUCTURAL TEES



*Theoretical Dimensions and Properties for Designing*

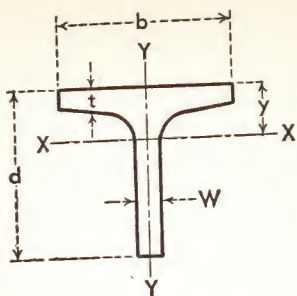
Section Number	Weight per Foot	Area of Section	Depth of Tee	Flange		Stem Thickness	AXIS X-X				AXIS Y-Y		
				Width	Average Thickness		I	S	r	y	I'	S'	r'
	lb	in. <sup>2</sup>	in.	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
BT 7 ST 7 WF	19	5.59	7.06	6.776	.513	.313	23.5	4.27	2.05	1.56	12.3	3.64	1.49
	17	5.00	7.00	6.750	.453	.287	21.1	3.86	2.05	1.55	10.6	3.15	1.46
	15	4.41	6.93	6.733	.383	.270	19.0	3.55	2.08	1.59	8.77	2.61	1.41
BT 6C ST 6 WF	80.5	23.69	6.94	12.515	1.486	.905	62.6	11.5	1.63	1.47	243.1	38.9	3.20
	66.5	19.56	6.69	12.365	1.236	.755	48.4	9.03	1.57	1.33	195.0	31.5	3.16
	60	17.65	6.56	12.320	1.106	.710	43.4	8.22	1.57	1.28	172.5	28.0	3.13
	53	15.59	6.44	12.230	.986	.620	36.7	7.01	1.53	1.20	150.4	24.6	3.11
	49.5	14.54	6.375	12.190	.921	.580	33.7	6.46	1.52	1.16	139.1	22.8	3.09
	46	13.53	6.31	12.155	.856	.545	31.0	5.98	1.51	1.13	128.2	21.1	3.08
	42.5	12.49	6.25	12.105	.796	.495	27.8	5.38	1.49	1.08	117.7	19.5	3.07
	39.5	11.61	6.19	12.080	.736	.470	25.8	5.02	1.48	1.06	108.2	17.9	3.05
	36	10.58	6.125	12.040	.671	.430	23.1	4.53	1.48	1.02	97.6	16.2	3.04
	32.5	9.55	6.06	12.000	.606	.390	20.6	4.06	1.47	.98	87.3	14.6	3.02
BT 6B ST 6 WF	29	8.53	6.095	10.014	.641	.359	19.0	3.75	1.49	1.03	53.7	10.7	2.51
	26.5	7.80	6.03	10.000	.576	.345	17.7	3.54	1.51	1.02	48.0	9.60	2.48
BT 6A ST 6 WF	25	7.36	6.095	8.077	.641	.371	18.7	3.80	1.60	1.17	28.2	6.98	1.96
	22.5	6.62	6.03	8.042	.576	.336	16.6	3.40	1.59	1.13	25.0	6.20	1.94
	20	5.89	5.97	8.000	.516	.294	14.4	2.94	1.56	1.08	22.0	5.50	1.94
BT 6 ST 6 WF	18	5.29	6.12	6.565	.540	.305	15.3	3.14	1.70	1.26	11.9	3.62	1.50
	15.5	4.56	6.045	6.525	.465	.265	13.0	2.69	1.69	1.22	9.91	3.04	1.47
	13.5	3.99	5.980	6.500	.400	.240	11.4	2.39	1.69	1.21	8.30	2.55	1.44
BT 6L ST 6 L	11.00	3.24	6.16	4.030	.424	.260	11.7	2.58	1.90	1.63	2.27	1.13	.84
	9.5	2.81	6.08	4.010	.349	.240	10.2	2.32	1.91	1.67	1.84	.92	.81
	8.25	2.43	6.00	4.000	.269	.230	9.02	2.13	1.93	1.76	1.39	.70	.76
BT 6J ST 6 J	7.00	2.07	5.96	3.970	.224	.200	7.66	1.83	1.92	1.76	1.13	.57	.74

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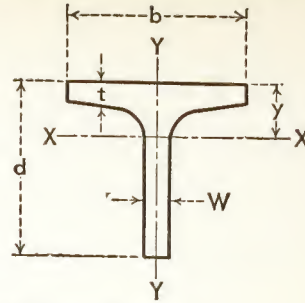
# BETHLEHEM STRUCTURAL TEES

*Theoretical Dimensions and Properties for Designing*

Section Number	Weight per Foot	Area of Section	Depth of Tee	Flange		Stem Thickness	AXIS X-X				AXIS Y-Y		
				Width	Average Thickness		I	S	r	y	I'	S'	r'
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
<b>BT 5B</b> ST 5 WF	56	16.46	5.69	10.415	1.248	.755	28.8	6.42	1.32	1.21	117.7	22.6	2.67
	50	14.72	5.56	10.345	1.118	.685	24.8	5.62	1.30	1.14	103.3	20.0	2.65
	44.5	13.09	5.44	10.275	.998	.615	21.3	4.88	1.28	1.07	90.3	17.6	2.63
	38.5	11.33	5.31	10.195	.868	.535	17.7	4.10	1.25	1.00	76.7	15.1	2.60
	36	10.59	5.25	10.170	.808	.510	16.4	3.83	1.24	.97	70.9	13.9	2.59
	33	9.70	5.19	10.117	.748	.457	14.5	3.39	1.22	.92	64.6	12.8	2.58
	30	8.83	5.125	10.075	.683	.415	12.8	3.02	1.21	.88	58.2	11.6	2.57
	27	7.94	5.06	10.028	.618	.368	11.2	2.64	1.18	.84	51.95	10.4	2.56
	24.5	7.20	5.00	10.000	.558	.340	10.1	2.40	1.18	.81	46.5	9.30	2.54
<b>BT 5A</b> ST 5 WF	22.5	6.62	5.06	8.022	.618	.350	10.3	2.48	1.25	.91	26.6	6.63	2.00
	19.5	5.74	4.97	7.990	.528	.318	8.96	2.19	1.25	.88	22.5	5.62	1.98
	16.5	4.85	4.875	7.964	.433	.292	7.80	1.95	1.27	.88	18.2	4.58	1.94
<b>BT 5</b> ST 5 WF	14.5	4.27	5.11	5.799	.500	.289	8.38	2.07	1.40	1.05	7.61	2.62	1.34
	12.5	3.67	5.04	5.762	.430	.252	7.12	1.77	1.39	1.02	6.34	2.20	1.31
	10.5	3.10	4.95	5.750	.340	.240	6.31	1.62	1.43	1.06	4.87	1.69	1.25
<b>BT 4B</b> ST 4 WF	33.5	9.85	4.50	8.287	.933	.575	10.94	3.07	1.05	.94	44.3	10.7	2.12
	29	8.53	4.375	8.222	.808	.510	9.11	2.60	1.03	.87	37.5	9.10	2.10
	24	7.06	4.25	8.117	.683	.405	6.92	2.00	.99	.78	30.45	7.50	2.08
	20	5.88	4.125	8.077	.558	.365	5.80	1.71	.99	.74	24.5	6.05	2.04
	17.5	5.15	4.06	8.027	.493	.315	4.88	1.45	.97	.69	21.25	5.30	2.03
	15.5	4.56	4.00	8.000	.433	.288	4.31	1.30	.97	.67	18.5	4.60	2.01
<b>BT 4A</b> ST 4 WF	14	4.11	4.03	6.540	.463	.285	4.22	1.28	1.01	.73	10.8	3.30	1.62
	12	3.53	3.965	6.500	.398	.245	3.53	1.08	1.00	.70	9.10	2.80	1.61
<b>BT 4</b> ST 4 WF	10	2.94	4.07	5.268	.378	.248	3.66	1.13	1.12	.83	4.25	1.61	1.20
	8.5	2.50	4.00	5.250	.308	.230	3.21	1.01	1.13	.84	3.36	1.28	1.16



# BETHLEHEM STRUCTURAL TEES



*Theoretical Dimensions and Properties for Designing*

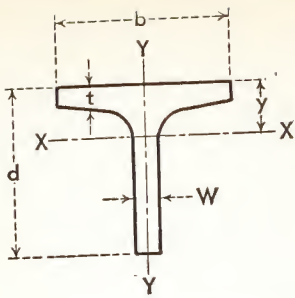
Section Number	Weight per Foot	Area of Section A	Depth of Tee d	Flange		Stem Thickness W	AXIS X-X				AXIS Y-Y		
				Width b	Average Thickness t		I	S	r	y	I'	S'	r'
				in.	in.		in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.
BT 6 I A ST 6 I	25	7.35	6.00	5.477	.660	.687	25.2	6.05	1.85	1.84	7.85	2.87	1.03
	20.4	5.99	6.00	5.250	.660	.460	18.8	4.26	1.77	1.57	6.77	2.58	1.06
BT 6 I ST 6 I	17.5	5.14	6.00	5.078	.544	.428	17.2	3.95	1.83	1.65	4.93	1.94	.98
	15.9	4.67	6.00	5.000	.544	.350	14.9	3.31	1.78	1.51	4.68	1.87	1.00
BT 5 I ST 5 I	17.5	5.15	5.00	4.944	.491	.594	12.5	3.63	1.56	1.56	4.18	1.69	.90
	12.7	3.73	5.00	4.660	.491	.310	7.81	2.05	1.45	1.20	3.39	1.46	.95
BT 4 I ST 4 I	11.5	3.38	4.00	4.171	.425	.441	5.03	1.77	1.22	1.15	2.15	1.03	.80
	9.2	2.70	4.00	4.000	.425	.270	3.50	1.14	1.14	.94	1.86	.93	.83
BT 3.5 I ST 3.5 I	10	2.94	3.50	3.860	.392	.450	3.36	1.36	1.07	1.04	1.58	.82	.73
	7.65	2.24	3.50	3.660	.392	.250	2.18	.81	.99	.81	1.32	.72	.77
BT 3 I ST 3 I	8.625	2.53	3.00	3.565	.359	.465	2.13	1.02	.92	.91	1.15	.65	.67
	6.25	1.83	3.00	3.330	.359	.230	1.27	.55	.83	.69	.93	.56	.71

CAR &  
SHIP

BULB

CAR

ZEES



# BETHLEHEM STRUCTURAL TEES

*Theoretical Dimensions and Properties for Designing*

Section Number	Weight per Foot	Area of Section	Depth of Tee	Flange		Stem Thickness	AXIS X-X				AXIS Y-Y		
				Width	Average Thickness		I	S	r	y	I'	S'	r'
A	d	b	t	W	I	S	r	y	I'	S'	r'		
lb	in. <sup>2</sup>	in.	in.	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	

## MISCELLANEOUS

<b>BT 5L</b> ST 5 L	9.5	2.80	5.13	4.020	.394	.250	6.70	1.74	1.55	1.28	2.09	1.04	.86
	8.5	2.49	5.06	4.010	.329	.240	6.07	1.62	1.56	1.32	1.73	.86	.83
	7.5	2.20	5.00	4.000	.269	.230	5.46	1.50	1.57	1.37	1.39	.70	.80
<b>BT 5J</b> ST 5 J	5.75	1.69	4.94	3.950	.204	.180	4.15	1.16	1.57	1.35	1.00	.51	.77
<b>BT 4L</b> ST 4 L	7.50	2.22	4.06	4.015	.314	.245	3.29	1.07	1.22	1.00	1.65	.82	.86
	6.50	1.91	4.00	4.000	.254	.230	2.90	.98	1.23	1.03	1.31	.66	.83
<b>BT 4J</b> ST 4 J	5.00	1.48	3.95	3.940	.204	.170	2.15	.72	1.21	.96	1.00	.51	.82
<b>BT 3L</b> ST 3 L	8.00	2.36	3.13	4.030	.404	.260	1.66	.68	.84	.67	2.16	1.07	.96
	6.00	1.77	3.00	4.000	.279	.230	1.30	.56	.86	.67	1.44	.72	.90
<b>BT 3J</b> ST 3 J	4.25	1.25	2.92	3.940	.194	.170	.90	.40	.85	.64	.94	.48	.87



# SPECIAL SHAPES

## *Part II*

Pages 58 to 69, inclusive, cover dimensions, weights and properties of special structural shapes. These shapes are generally used for a special purpose and consequently the rollings are irregular and infrequent. Unless the tonnage of any one size is sufficient in itself to warrant a rolling, the use of these sections should be avoided and sections with regular rollings should be specified. Before specifying any of these special sizes, it is recommended that the Home Office be consulted in regard to delivery possibilities.

These pages cover information on Special Car Building and Shipbuilding Channels; Special Shipbuilding Bulb Angles; Special Car Building Bulb Angles; Car Building Half Center Sill Sections; Car Building Side Plate Section; Car Building Side Post Section; Car Building W-Side Plate Section and Special Rolled Zees.



CAR &  
SHIP



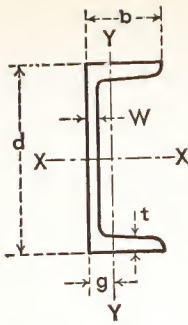
BULB



CAR



ZEEs



# SPECIAL CHANNELS

## Car Building and Shipbuilding

*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Channel	Flange		Web Thickness	AXIS X-X			AXIS Y-Y			
				Width	Average Thickness		I	S	r	I'	S'	r'	g
A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.		
lb	in. <sup>2</sup>	in.	in.	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	
SC 18	For details see page 36												
SC 13 13 x 4	50.0	14.66	13	4.412	.610	.787	312.9	48.1	4.62	16.7	4.9	1.07	.98
	40.0	11.71	13	4.185	.610	.560	271.4	41.7	4.82	13.9	4.3	1.09	.97
	35.0	10.24	13	4.072	.610	.447	250.7	38.6	4.95	12.5	4.0	1.10	.99
	31.8	9.30	13	4.000	.610	.375	237.5	36.5	5.05	11.6	3.9	1.11	1.01
SC 12B 12 x 4	50.0	14.64	12	4.135	.700	.835	267.9	44.6	4.28	17.8	5.8	1.10	1.06
	45.0	13.24	12	4.000	.700	.700	248.4	41.4	4.37	16.0	5.4	1.11	1.05
	40.0	11.70	12	3.890	.700	.590	232.6	38.8	4.46	14.5	5.1	1.11	1.05
	35.0	10.22	12	3.767	.700	.467	214.9	35.8	4.58	12.9	4.8	1.12	1.07
SC 12 (BSC 25) 12 x 3½	37.0	10.80	12	3.600	.600	.600	203.4	33.9	4.34	10.3	3.8	.98	.89
	32.9	9.60	12	3.500	.600	.500	189.0	31.5	4.44	9.4	3.6	.99	.89
	30.9	9.00	12	3.450	.600	.450	181.8	30.3	4.50	8.9	3.5	.99	.90
SC 10B 10 x 4	*41.1	12.06	10	4.319	.575	.794	156.3	31.3	3.61	16.4	5.1	1.17	1.11
	33.6	9.80	10	4.100	.575	.575	138.0	27.6	3.75	13.7	4.6	1.18	1.11
	28.5	8.30	10	3.950	.575	.425	125.5	25.1	3.89	11.8	4.2	1.19	1.15
SC 10 (BSC 20) 10 x 3½	28.3	8.23	10	3.500	.575	.475	116.9	23.4	3.77	8.6	3.4	1.02	.96
	24.9	7.23	10	3.400	.575	.375	108.6	21.7	3.88	7.6	3.2	1.03	.98
SC 10A 10 x 3½	25.3	7.38	10	3.550	.500	.425	106.0	21.2	3.79	7.9	3.0	1.04	.94
	21.9	6.38	10	3.450	.500	.325	97.6	19.5	3.91	7.0	2.8	1.05	.98

Dimensions and properties of corresponding British standard section are shown opposite the British number marked BSC.

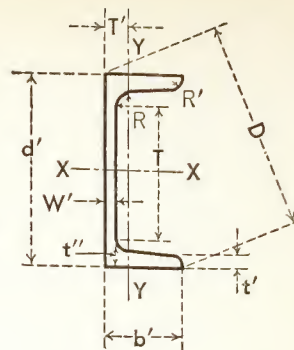
\* Rolled by arrangement for cars.



# SPECIAL CHANNELS

## Car Building and Shipbuilding

*Approximate Dimensions for Detailing*

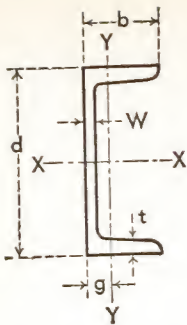


Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent		Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Radius of Rounding (Toe)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root		Web (Nominal)	Distance (Nominal)				
	lb	d'	b'	t'	t''	W'	T	T'	D	R	R'	deg
SC 18	For details see page 36											
SC 13 13 x 4	50	13	4 $\frac{3}{8}$	$\frac{5}{16}$	$\frac{7}{8}$	1 $\frac{3}{16}$	10 $\frac{3}{8}$	1 $\frac{3}{16}$	13 $\frac{3}{4}$	.48	.23	8.5
	40	13	4 $\frac{1}{8}$	$\frac{5}{16}$	$\frac{7}{8}$	$\frac{9}{16}$	10 $\frac{3}{8}$	1	13 $\frac{5}{8}$	.48	.23	8.5
	35	13	4 $\frac{1}{8}$	$\frac{5}{16}$	$\frac{7}{8}$	$\frac{7}{16}$	10 $\frac{3}{8}$	$\frac{7}{8}$	13 $\frac{5}{8}$	.48	.23	8.5
	31.8	13	4	$\frac{5}{16}$	$\frac{7}{8}$	$\frac{3}{8}$	10 $\frac{3}{8}$	1 $\frac{3}{16}$	13 $\frac{5}{8}$	.48	.23	8.5
SC 12B 12 x 4	50	12	4 $\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	9 $\frac{1}{2}$	1 $\frac{5}{16}$	12 $\frac{3}{4}$	.50	.30	1.7
	45	12	4	$\frac{5}{8}$	$\frac{3}{4}$	1 $\frac{1}{16}$	9 $\frac{1}{2}$	1 $\frac{3}{16}$	12 $\frac{5}{8}$	.50	.30	1.7
	40	12	3 $\frac{7}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	9 $\frac{1}{2}$	1 $\frac{1}{16}$	12 $\frac{5}{8}$	.50	.30	1.7
	35	12	3 $\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	9 $\frac{1}{2}$	1 $\frac{5}{16}$	12 $\frac{5}{8}$	.50	.30	1.7
SC 12 (BSC 25) 12 x 3 $\frac{1}{2}$	37	12	3 $\frac{5}{8}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{5}{8}$	9 $\frac{1}{2}$	1 $\frac{3}{16}$	12 $\frac{1}{2}$	.60	.425	2
	32.9	12	3 $\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{1}{2}$	9 $\frac{1}{2}$	1 $\frac{1}{16}$	12 $\frac{1}{2}$	.60	.425	2
	30.9	12	3 $\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{7}{16}$	9 $\frac{1}{2}$	1	12 $\frac{1}{2}$	.60	.425	2
SC 10B 10 x 4	*41.1	10	4 $\frac{5}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	1 $\frac{3}{16}$	7 $\frac{5}{8}$	1 $\frac{1}{4}$	10 $\frac{7}{8}$	.575	.40	2
	33.6	10	4 $\frac{1}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{9}{16}$	7 $\frac{5}{8}$	1 $\frac{1}{8}$	10 $\frac{3}{4}$	.575	.40	2
	28.5	10	4	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{7}{16}$	7 $\frac{5}{8}$	1	10 $\frac{3}{4}$	.575	.40	2
SC 10 (BSC 20) 10 x 3 $\frac{1}{2}$	28.3	10	3 $\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{1}{2}$	7 $\frac{5}{8}$	1	10 $\frac{5}{8}$	.575	.40	2
	24.9	10	3 $\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{8}$	7 $\frac{5}{8}$	1 $\frac{5}{16}$	10 $\frac{1}{2}$	.575	.40	2
SC 10A 10 x 3 $\frac{1}{2}$	25.3	10	3 $\frac{1}{2}$	$\frac{7}{16}$	$\frac{9}{16}$	$\frac{7}{16}$	7 $\frac{7}{8}$	1 $\frac{5}{16}$	10 $\frac{5}{8}$	.50	.35	2
	21.9	10	3 $\frac{1}{2}$	$\frac{7}{16}$	$\frac{9}{16}$	$\frac{5}{16}$	7 $\frac{7}{8}$	1 $\frac{3}{16}$	10 $\frac{5}{8}$	.50	.35	2

Dimensions and properties of corresponding British standard section are shown opposite the British number marked BSC.

\* Rolled by arrangement for cars.





# SPECIAL CHANNELS

## Car Building and Shipbuilding

*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Channel	Flange		Web Thickness	AXIS X-X			AXIS Y-Y			
				Width	Average Thickness		I	S	r	I'	S'	r'	g
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
<b>SC 9</b> (BSC 17)	25.4	7.41	9	3.500	.550	.450	87.3	19.4	3.43	8.0	3.2	1.04	1.00
9 x 3½	23.9	6.96	9	3.450	.550	.400	84.3	18.7	3.48	7.5	3.1	1.04	1.01
<b>SC 8</b> (BSC 13)	22.8	6.63	8	3.500	.525	.425	63.3	15.8	3.09	7.4	3.0	1.05	1.04
8 x 3½	21.4	6.23	8	3.450	.525	.375	61.2	15.3	3.13	6.9	2.9	1.05	1.05
<b>SC 8A</b> 8 x 3	20.0	5.83	8	3.025	.500	.400	54.0	13.5	3.05	4.7	2.2	.90	.86
	18.7	5.43	8	2.975	.500	.350	51.9	13.0	3.09	4.4	2.1	.90	.88
<b>SC 7</b> 7 x 3½	22.7	6.60	7	3.600	.500	.500	47.1	13.5	2.67	7.5	3.0	1.07	1.07
	19.1	5.55	7	3.450	.500	.350	42.8	12.2	2.78	6.3	2.7	1.07	1.11
<b>SC 7B</b> (BSC 9) 7 x 3	17.6	5.12	7	3.000	.475	.375	37.3	10.7	2.70	4.2	2.0	.90	.90

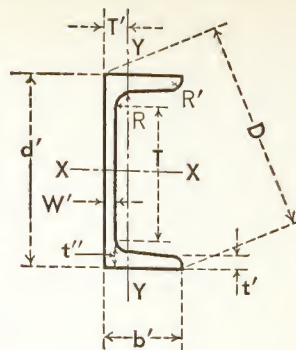
Dimensions and properties of corresponding British standard section are shown opposite the British number marked BSC.



# SPECIAL CHANNELS

## Car Building and Shipbuilding

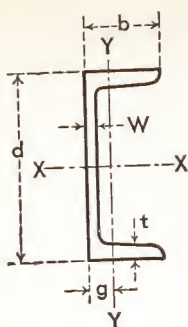
*Approximate Dimensions for Detailing*



Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section  d'	Flange			Web Thickness (Nominal)  W'	Tangent		Diagonal Dimension (Nominal)  D	Radius of Fillet (Root)  R	Radius of Rounding (Toe)  R'	Slope Inside Flange
			Width (Nominal)  b'	Thick-ness (Nominal) at Toe  t'	Thick-ness (Nominal) at Root  t''		Web (Nominal)  T	Dis-tance (Nominal)  T'				
<b>SC 9</b> (BSC 17)	25.4	9	3½	½	⅝	7/16	6¾	1	9⅝	.550	.375	2.0
9 x 3½	23.9	9	3½	½	⅝	7/16	6¾	1⅝	9⅝	.550	.375	2.0
<b>SC 8</b> (BSC 13)	22.8	8	3½	½	9/16	7/16	5⅞	1⅝	8¾	.525	.375	2.0
8 x 3½	21.4	8	3½	½	9/16	¾	5⅞	7/8	8¾	.525	.375	2.0
<b>SC 8A</b> 8 x 3	20.0	8	3	7/16	9/16	7/16	5⅞	7/8	8½	.500	.350	2.0
	18.7	8	3	7/16	9/16	¾	5⅞	1⅜	8½	.500	.350	2.0
<b>SC 7</b> 7 x 3½	22.7	7	3⅝	7/16	9/16	½	4⅞	1	7⅞	.500	.350	2.0
	19.1	7	3½	7/16	9/16	¾	4⅞	1⅜	7¾	.500	.350	2.0
<b>SC 7B</b> (BSC 9) 7 x 3	17.6	7	3	7/16	½	¾	5	1⅜	7⅝	.475	.325	2.0

Dimensions and properties of corresponding British standard section are shown opposite the British number marked BSC.





# SPECIAL CHANNELS

## Car Building and Shipbuilding

*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section	Depth of Channel	Flange		Web Thickness	AXIS X-X			AXIS Y-Y			
				Width	Average Thickness		I	S	r	I'	S'	r'	g
		A	d	b	t	W	in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
<b>SC 6</b> (BSC 8) 6 x 3½	18.0	5.22	6	3.500	.475	.375	29.4	9.8	2.38	6.1	2.6	1.08	1.15
<b>SC 6A</b> 6 x 3½	15.3	4.47	6	3.500	.385	.340	25.3	8.4	2.38	5.1	2.1	1.07	1.08
<b>SC 6C</b> (BSC 7)	16.3	4.75	6	3.000	.475	.375	25.8	8.6	2.33	4.0	1.9	.91	.95
6 x 3	15.1	4.37	6	2.938	.475	.313	24.7	8.2	2.38	3.6	1.8	.91	.97
<b>SC 6B</b> (BSC 5) 6 x 2½	12.0	3.52	6	2.500	.375	.313	18.6	6.2	2.30	2.0	1.1	.75	.72
<b>*SC 3</b>	9.0	2.64	3	2.125	.351	.500	3.1	2.1	1.09	.97	.68	.61	.70
3 x 1¾	7.1	2.08	3	1.938	.351	.312	2.7	1.8	1.14	.71	.56	.59	.67

Dimensions and properties of corresponding British standard section are shown opposite the British number marked BSC.

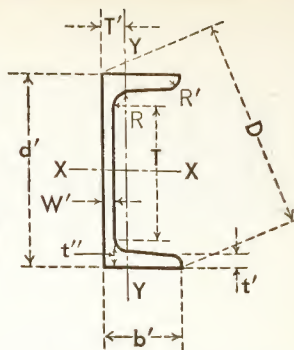
\* SC 3B has same dimensions as SC 3 except that flanges flare outward to 3¼ in. across the toe.



# SPECIAL CHANNELS

## Car Building and Shipbuilding

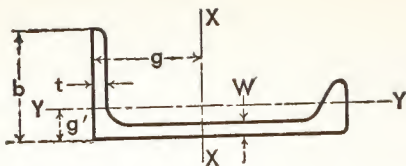
*Approximate Dimensions for Detailing*



Section Number and Nominal Size	Weight per Foot	Depth (Nominal) of Section	Flange			Web Thickness (Nominal)	Tangent	Distance (Nominal)	Diagonal Dimension (Nominal)	Radius of Fillet (Root)	Radius of Rounding (Toe)	Slope Inside Flange
			Width (Nominal)	Thickness (Nominal) at Toe	Thickness (Nominal) at Root							
			d'	b'	t'		t''					
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
<b>SC 6</b> (BSC 8) 6 x 3½	18.0	6	3½	7/16	½	¾	4	13/16	7	.475	.325	2.0
<b>SC 6A</b> 6 x 3½	15.3	6	3½	5/16	7/16	¾	4¾	1 1/16	7	.385	.300	2.0
<b>SC 6C</b> (BSC 7)	16.3	6	3	7/16	½	¾	4	13/16	6¾	.475	.325	2.0
6 x 3	15.1	6	3	7/16	½	5/16	4	¾	65/8	.475	.325	2.0
<b>SC 6B</b> (BSC 5) 6 x 2½	12.0	6	2½	5/16	7/16	5/16	4½	1 1/16	6½	.375	.260	2.0
<b>SC 3</b>	9.0	3	2⅞	5/16	¾	½	1⅞	1 1/16	35/8	.190	.060	2.7
3 x 1⅞	7.1	3	2	5/16	¾	5/16	1⅞	½	35/8	.190	.060	2.7

Dimensions and properties of corresponding British standard section are shown opposite the British number marked BSC.





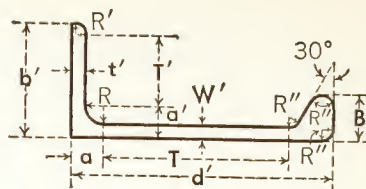
# SPECIAL BULB ANGLES Shipbuilding

*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section A	Flange Thick-ness t	Flange Width b	Web Thick-ness W	AXIS X-X				AXIS Y-Y			
						I	S	r	g	I'	S'	r'	g'
						in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
<b>BA 103</b> 10 x 3½	32.3	9.49	.61	3.69	.64	118.1	22.1	3.53	4.69	6.2	2.2	0.81	0.77
	29.9	8.78	.58	3.63	.58	110.7	20.9	3.55	4.70	5.6	2.0	0.80	0.75
	27.2	7.98	.485	3.57	.52	102.9	19.6	3.59	4.80	5.1	1.8	0.80	0.72
	24.8	7.28	.455	3.51	.46	95.4	18.4	3.62	4.82	4.6	1.6	0.80	0.70
	22.4	6.57	.425	3.45	.40	88.0	17.2	3.66	4.85	4.1	1.5	0.79	0.68
<b>BA 93</b> 9 x 3½	23.8	7.00	.465	3.57	.50	73.3	15.1	3.24	4.19	4.7	1.7	0.82	0.72
	21.6	6.35	.435	3.51	.44	67.7	14.1	3.27	4.21	4.2	1.5	0.82	0.70
	19.4	5.70	.405	3.45	.38	62.2	13.1	3.30	4.22	3.7	1.4	0.81	0.68
<b>BA 84</b> 8 x 3½	24.3	7.14	.55	3.68	.58	57.0	12.7	2.83	3.53	5.2	1.9	0.85	0.78
	20.0	5.87	.43	3.56	.46	48.9	11.1	2.89	3.61	4.2	1.5	0.85	0.72
	16.0	4.70	.37	3.44	.34	40.9	9.4	2.95	3.62	3.3	1.2	0.84	0.69
<b>BA 74</b> 7 x 3½	21.1	6.19	.54	3.68	.56	37.5	9.2	2.46	2.95	4.8	1.8	0.88	0.80
	17.1	5.03	.41	3.56	.44	32.0	8.0	2.52	3.03	3.9	1.4	0.88	0.74
	13.6	3.98	.35	3.44	.32	26.4	6.7	2.58	3.01	3.0	1.1	0.87	0.71
<b>BA 64</b> 6 x 3½	17.4	5.12	.49	3.69	.52	22.7	6.3	2.10	2.42	4.3	1.6	0.92	0.82
	13.9	4.06	.365	3.57	.40	19.0	5.3	2.16	2.47	3.4	1.2	0.91	0.76
	10.7	3.13	.305	3.45	.28	15.3	4.4	2.21	2.45	2.6	0.94	0.91	0.73
<b>BA 52</b> 5 x 2½	9.8	2.88	.33	2.56	.36	9.1	3.1	1.78	2.06	1.1	0.56	0.63	0.55
	7.3	2.13	.27	2.44	.24	7.1	2.4	1.83	2.01	0.81	0.42	0.62	0.51



# SPECIAL BULB ANGLES Shipbuilding



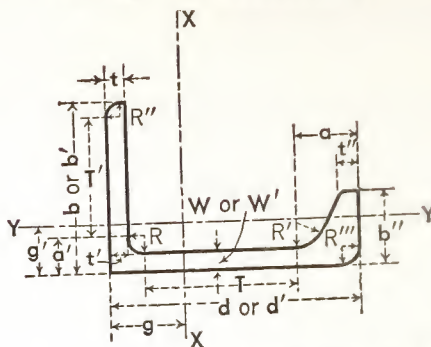
*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Flange		Web		Width of Bulb (Nominal)	Tangents				Radius of Fillet (Root)	Radii of Roundings	
		Width (Nominal)	Thick-ness (Nominal)	Depth (Nominal)	Thick-ness (Nominal)		Web (Nominal)		Flange (Nominal)				
							a	T	a'	T'			
												b'	t'
	lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
BA 103 10 x 3½	32.3	3¾	⅝	10	⅝	1 15⁄16	1 ⅛	7¾	1 3⁄16	2¼	.54	.27	.40
	29.9	3⅝	9⁄16	10	9⁄16	1 7⁄8	1 ⅛	7¾	1 ⅛	2¼	.54	.27	.40
	27.2	3⅝	½	10	½	1 13⁄16	1	7¾	1 1⁄16	2¼	.54	.27	.40
	24.8	3½	7⁄16	10	7⁄16	1 ¾	1	7¾	1	2¼	.54	.27	.40
	22.4	3½	7⁄16	10	¾	1 1 1⁄16	1 5⁄16	7¾	1 5⁄16	2¼	.54	.27	.40
BA 93 9 x 3½	23.8	3⅝	7⁄16	9	½	1 1 1⁄16	1	6 9⁄16	1 1⁄16	2¼	.54	.27	.36
	21.6	3½	7⁄16	9	7⁄16	1 5⁄8	1	6 9⁄16	1	2¼	.54	.27	.36
	19.4	3½	¾	9	¾	1 9⁄16	1 5⁄16	6 9⁄16	1 5⁄16	2¼	.54	.27	.36
BA 84 8 x 3½	24.3	3⅝	9⁄16	8	9⁄16	1 5⁄8	1 1⁄16	5¾	1 ⅛	2 5⁄16	.54	.27	.32
	20.0	3½	7⁄16	8	7⁄16	1 ½	1	5¾	1	2 5⁄16	.54	.27	.32
	16.0	3½	¾	8	5⁄16	1 ¾	1 5⁄16	5¾	7⁄8	2 5⁄16	.54	.27	.32
BA 74 7 x 3½	21.1	3⅝	9⁄16	7	9⁄16	1 ½	1 1⁄16	4 15⁄16	1 ⅛	2 5⁄16	.54	.27	.28
	17.1	3½	7⁄16	7	7⁄16	1 ¾	1 5⁄16	4 15⁄16	1	2 5⁄16	.54	.27	.28
	13.6	3½	¾	7	5⁄16	1 ¼	7⁄8	4 15⁄16	7⁄8	2 5⁄16	.54	.27	.28
BA 64 6 x 3½	17.4	3¾	½	6	½	1 5⁄16	1	4 3⁄16	1 1⁄16	2 ¾	.54	.27	.24
	13.9	3⅝	¾	6	¾	1 3⁄16	7⁄8	4 3⁄16	1 5⁄16	2 ¾	.54	.27	.24
	10.7	3½	5⁄16	6	¼	1 1⁄16	7⁄8	4 3⁄16	1 3⁄16	2 ¾	.54	.27	.24
BA 52 5 x 2½	9.8	2½	5⁄16	5	¾	1	¾	3½	¾	1 9⁄16	.42	.21	.20
	7.3	2½	¼	5	¼	7⁄8	1 1⁄16	3½	1 1⁄16	1 9⁄16	.42	.21	.20



# SPECIAL BULB ANGLES

## Car Building



*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section A	Depth of Section d	Web Thickness W	Flange Width b	AXIS X-X				AXIS Y-Y			
						I	S	r	g	I'	S'	r'	g'
						in. <sup>4</sup>	in. <sup>3</sup>	in.	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
<b>BA 5</b> 5 x 4½	19.1	5.64	5.00	.438	4.50	20.7	7.9	1.92	2.38	8.0	2.4	1.19	1.19
<b>BA 5A</b> 5 x 3½	13.0	3.81	5.00	.375	3.50	13.4	4.8	1.88	2.22	3.3	1.2	.93	.86
<b>BA 4</b> 4 x 3½	11.9	3.48	4.00	.375	3.50	7.9	3.5	1.50	1.77	3.1	1.2	.94	.94
<b>BA 4A</b> 4 x 3½	14.3	4.20	4.00	.500	3.50	8.7	3.7	1.44	1.65	3.8	1.5	.96	.99

*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Depth (Nom) of Section	Flange			Web Thickness (Nom)	Bulb		Tangents				Radii of Fillet (Root)	Radii of Roundings			
			Width (Nom)	Thickness at Toe (Nom)	Thickness at Root (Nom)		Width (Nom)	Thickness (Nom)	Web (Nominal)		Flange (Nominal)			R	R'	R''	R'''
									a	T	a'	T'					
lb	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.		
BA 5 5 x 4½	19.1	5	4½	7/16	7/16	7/16	2¼	9/16	1⅝	29/16	13/16	35/16	¾	½	¾	½	
BA 5A 5 x 3½	13.0	5	3½	¾	¾	¾	1½	7/16	1¼	3	¾	27/16	¾	½	5/16	¾	
BA 4 4 x 3½	11.9	4	3½	¾	¾	¾	1½	½	1⅞ <sub>32</sub>	13 1/32	¾	27/16	¾	½	5/16	¾	
BA 4A 4 x 3½	14.3	4	3½	½	½	½	1½	½	1¼	1⅞	7/8	25/16	¾	½	5/16	¾	

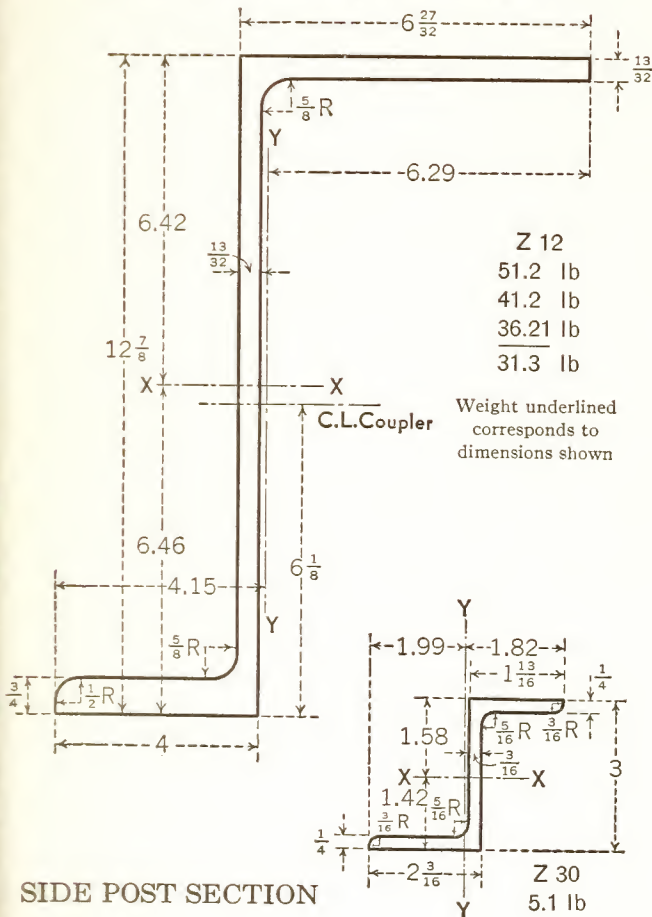


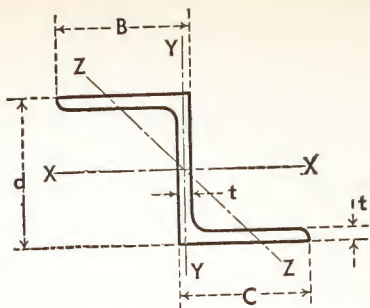
# SPECIAL SECTIONS

## Car Building

(All dimensions are in inches)

### HALF CENTER SILL SECTION





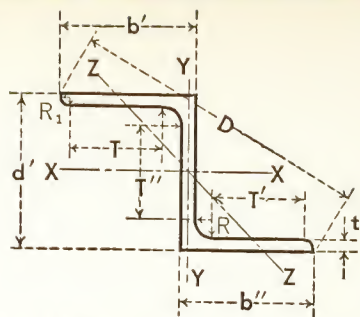
# SPECIAL ZEES

*Theoretical Dimensions and Properties for Designing*

Section Number and Nominal Size	Weight per Foot	Area of Section	Flange		Depth of Section	Flange and Stem Thickness	AXIS X-X			AXIS Y-Y			AXIS Z-Z
			Width	Width			I	S	r	I'	S'	r'	r''
			B	C			in. <sup>4</sup>	in. <sup>3</sup>	in.	in. <sup>4</sup>	in. <sup>3</sup>	in.	in.
<b>Z 4A</b> 4 x 3	15.9	4.66	3.12	3.12	4.06	.500	11.2	5.5	1.55	8.0	2.8	1.31	.67
<b>Z 4</b> 4 x 3	12.5	3.66	3.19	3.19	4.12	.375	9.6	4.7	1.62	6.8	2.3	1.36	.69
	10.3	3.03	3.12	3.12	4.06	.312	7.9	3.9	1.62	5.5	1.8	1.34	.68
	8.2	2.41	3.06	3.06	4.00	.250	6.3	3.1	1.62	4.2	1.4	1.33	.67
<b>Z 3B</b> 3 x 2¾	12.6	3.69	2.69	2.69	3.00	.500	4.6	3.1	1.12	4.9	2.0	1.15	.53
<b>Z 3A</b> 3 x 2¾	9.8	2.86	2.69	2.69	3.00	.375	3.9	2.6	1.16	3.9	1.6	1.17	.54
<b>Z 3</b> 3 x 2¾	6.7	1.97	2.69	2.69	3.00	.250	2.9	1.9	1.21	2.8	1.1	1.19	.55



# SPECIAL ZEES



*Approximate Dimensions for Detailing*

Section Number and Nominal Size	Weight per Foot	Flanges		Depth (Approx)	Flange and Stem Thickness	Radii		Tangents			Diagonal Distance
		Width (Approx)	Width (Approx)			Fillet	Roundings (Approx)	T	T'	T''	
		$b'$	$b''$		$t'$	R	$R_1$	(Approx)	(Approx)	(Approx)	
		in.	in.		in.	in.	in.	in.	in.	in.	in.
<b>Z 4A</b> 4 x 3	15.9	3 $\frac{1}{8}$	3 $\frac{1}{8}$	4 $\frac{1}{16}$	$\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{8}$	1 $\frac{15}{16}$	1 $\frac{15}{16}$	2 $\frac{7}{16}$	7 $\frac{1}{8}$
<b>Z 4</b> 4 x 3	12.5	3 $\frac{3}{16}$	3 $\frac{3}{16}$	4 $\frac{1}{8}$	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{3}{4}$	7 $\frac{1}{4}$
	10.3	3 $\frac{1}{8}$	3 $\frac{1}{8}$	4 $\frac{1}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{13}{16}$	7 $\frac{3}{16}$
	8.2	3 $\frac{1}{16}$	3 $\frac{1}{16}$	4	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{7}{8}$	7 $\frac{1}{8}$
<b>Z 3B</b> 3 x 2 $\frac{3}{4}$	12.6	2 $\frac{11}{16}$	2 $\frac{11}{16}$	3	$\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{8}$	5 $\frac{3}{4}$
<b>Z 3A</b> 3 x 2 $\frac{3}{4}$	9.8	2 $\frac{11}{16}$	2 $\frac{11}{16}$	3	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{5}{16}$	1 $\frac{11}{16}$	1 $\frac{11}{16}$	1 $\frac{5}{8}$	5 $\frac{13}{16}$
<b>Z 3</b> 3 x 2 $\frac{3}{4}$	6.7	2 $\frac{11}{16}$	2 $\frac{11}{16}$	3	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{16}$	1 $\frac{15}{16}$	1 $\frac{15}{16}$	1 $\frac{7}{8}$	5 $\frac{15}{16}$



# DECIMALS OF A FOOT FOR INCHES AND FRACTIONS OF AN INCH

Use of table in estimating weights of cut-to-length sections:

**EXAMPLE:** To find weight of 7 pieces, B 12 L (16.5 lb per ft), 29 ft 5 1/4 in. long.  
Weight of one piece = 16.5 x 29.448 (from table) = 485.9 lb.  
Weight of 7 pieces = 7 x 485.9 = 3401.3 lb.

Inches	0	1	2	3	4	5	Inches
0	0	.083	.167	.25	.333	.417	0
1/8	.01	.094	.177	.26	.344	.427	1/8
1/4	.021	.104	.188	.271	.354	.438	1/4
3/8	.031	.115	.198	.281	.365	.448	3/8
1/2	.042	.125	.208	.292	.375	.458	1/2
5/8	.052	.135	.219	.302	.385	.469	5/8
3/4	.063	.146	.229	.313	.396	.479	3/4
7/8	.073	.156	.24	.323	.406	.49	7/8
Inches	6	7	8	9	10	11	Inches
0	.5	.583	.667	.75	.833	.917	0
1/8	.51	.594	.677	.76	.844	.927	1/8
1/4	.521	.604	.688	.771	.854	.938	1/4
3/8	.531	.615	.698	.781	.865	.948	3/8
1/2	.542	.625	.708	.792	.875	.958	1/2
5/8	.552	.635	.719	.802	.885	.969	5/8
3/4	.563	.646	.729	.813	.896	.979	3/4
7/8	.573	.656	.74	.823	.906	.99	7/8



# DECIMALS OF AN INCH FOR EACH 64<sup>TH</sup>

*With Millimeter Equivalents*

Fraction	$\frac{1}{64}$ ths	Decimal Equivalent	Millimeters	Fraction	$\frac{1}{64}$ ths	Decimal Equivalent	Millimeters
..	1	.015625	0.39688	..	33	.515625	13.09690
$\frac{1}{32}$	2	.03125	0.79375	$\frac{17}{32}$	34	.53125	13.49378
..	3	.046875	1.19063	..	35	.546875	13.89065
$\frac{1}{16}$	4	.0625	1.58750	$\frac{9}{16}$	36	.5625	14.28753
..	5	.078125	1.98438	..	37	.578125	14.68440
$\frac{3}{32}$	6	.09375	2.38125	$\frac{19}{32}$	38	.59375	15.08128
..	7	.109375	2.77813	..	39	.609375	15.47816
$\frac{1}{8}$	8	.125	3.17501	$\frac{5}{8}$	40	.625	15.87503
..	9	.140625	3.57188	..	41	.640625	16.27191
$\frac{5}{32}$	10	.15625	3.96876	$2\frac{1}{32}$	42	.65625	16.66878
..	11	.171875	4.36563	..	43	.671875	17.06566
$\frac{3}{16}$	12	.1875	4.76251	$1\frac{1}{16}$	44	.6875	17.46253
..	13	.203125	5.15939	..	45	.703125	17.85941
$\frac{7}{32}$	14	.21875	5.55626	$2\frac{3}{32}$	46	.71875	18.25629
..	15	.234375	5.95314	..	47	.734375	18.65316
$\frac{1}{4}$	16	.25	6.35001	$\frac{3}{4}$	48	.75	19.05004
..	17	.265625	6.74689	..	49	.765625	19.44691
$\frac{9}{32}$	18	.28125	7.14376	$2\frac{5}{32}$	50	.78125	19.84379
..	19	.296875	7.54064	..	51	.796875	20.24067
$\frac{5}{16}$	20	.3125	7.93752	$1\frac{3}{16}$	52	.8125	20.63754
..	21	.328125	8.33439	..	53	.828125	21.03442
$1\frac{1}{32}$	22	.34375	8.73127	$2\frac{7}{32}$	54	.84375	21.43129
..	23	.359375	9.12814	..	55	.859375	21.82817
$\frac{3}{8}$	24	.375	9.52502	$\frac{7}{8}$	56	.875	22.22504
..	25	.390625	9.92189	..	57	.890625	22.62192
$1\frac{3}{32}$	26	.40625	10.31877	$2\frac{9}{32}$	58	.90625	23.01880
..	27	.421875	10.71565	..	59	.921875	23.41567
$\frac{7}{16}$	28	.4375	11.11252	$1\frac{5}{16}$	60	.9375	23.81255
..	29	.453125	11.50940	..	61	.953125	24.20942
$1\frac{5}{32}$	30	.46875	11.90627	$3\frac{1}{32}$	62	.96875	24.60630
..	31	.484375	12.30315	..	63	.984375	25.00318
$\frac{1}{2}$	32	.5	12.70003	1	64	1.	25.40005

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